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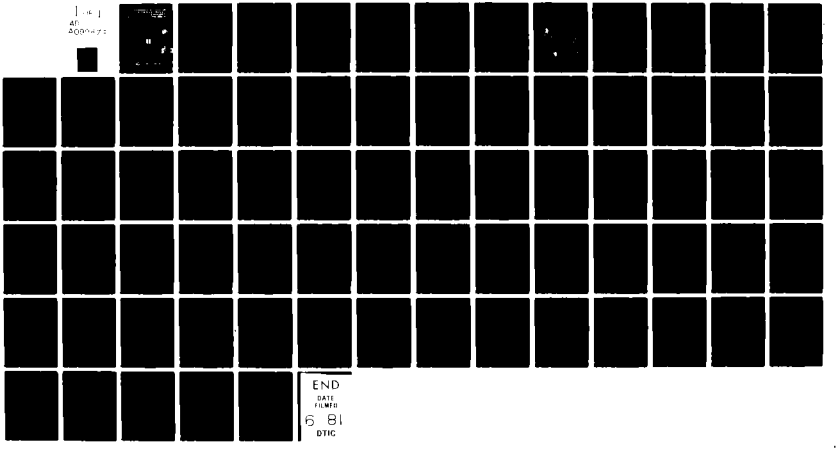

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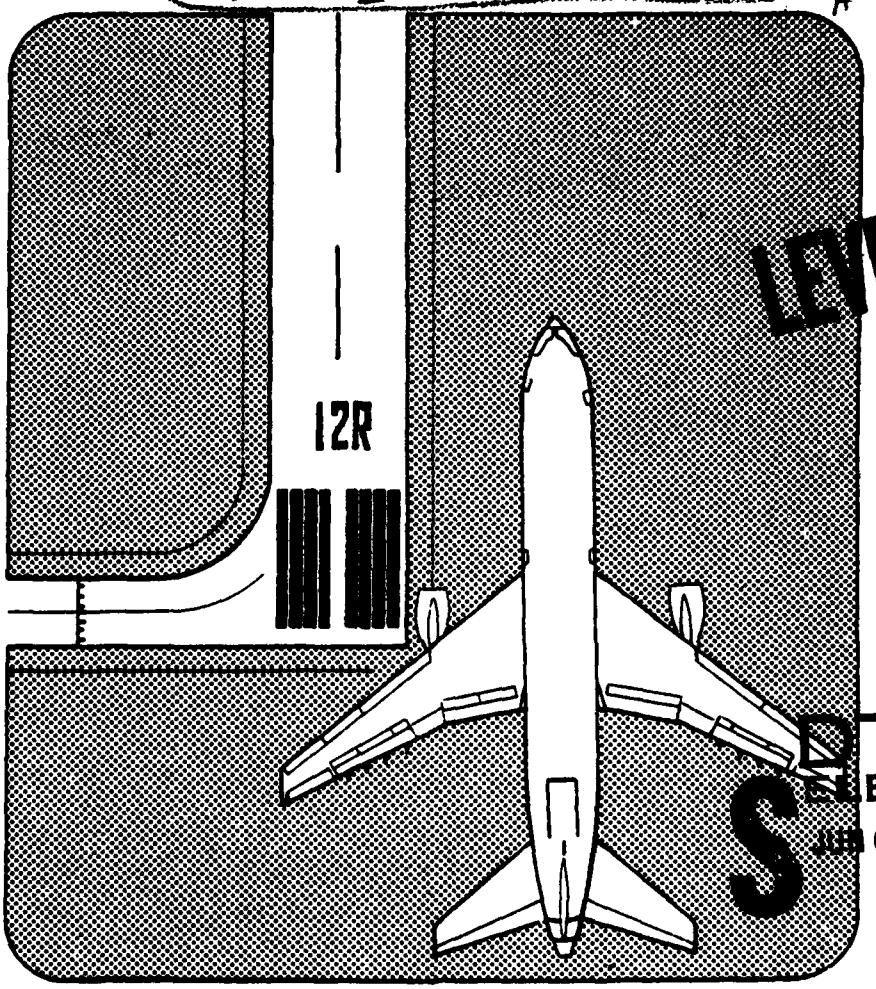
AIRPORT IMPROVEMENT TASK FORCE DELAY STUDIES



LEVEL III

prepared for
DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
under contract
DOT-FA77WA-3961

PMM&Co. Peat, Marwick, Mitchell & Co.

MAY 1981

ATTACHMENT A

EXPERIMENTAL DESIGN AND

TABLE OF EXPERIMENTS

Lambert-St. Louis International Airport

St. Louis
Airport Improvement Task Force Delay Studies

Prepared by

Peat, Marwick, Mitchell & Co.
San Francisco, California

May 1980

Table 1

REVISED DESCRIPTION OF EXPERIMENTS
Lambert-St. Louis International Airport
Airport Improvement Task Force Delay Studies

Experiment number	Model	Arrival runways	Departure runways	Weather	Demand	ATC	Improvements
1	ASM[a]	12R,12L	12R,12L	VFR	1979 Demand and Mix	Present[b]	Baseline
2	ASM	12R,12L	12R,12L	IFR1	1979 Demand and Mix	Present	Baseline
3	ASM	12R,12L	12R,12L	IFR2	1979 Demand and Mix	Present	Baseline
4	ASM	30R,30L	30R,30L	VFR	1979 Demand and Mix	Present	Baseline
5	ASM	30R,30L	30R,30L	IFR1	1979 Demand and Mix	Present	Baseline
6	ASM	30R,30L	30R,30L	IFR2	1979 Demand and Mix	Present	Baseline
7	ASM	30R,30L,24	30R,30L	IFR1	1979 Demand and Mix	Present	Baseline
7a	ASM	30R,30L,24	30R,30L	VFR	1979 Demand and Mix	Present	Baseline
8	ASM	12R,12L	6,12R,12L	VFR	1979 Demand and Mix	Present	Baseline
9	ASM	12R,12L	6,12R,12L	IFR1	1979 Demand and Mix	Present	Baseline
10	ASM	12R,12L	6,12R,12L	IFR2	1979 Demand and Mix	Present	Baseline
11	ASM	24	24	IFR2	1979 Demand and Mix	Present	Baseline
12	ASM	12R,12L,17	12R,12L	VFR	1979 Demand and Mix	Present	Baseline
13	ASM	12R,12L,17	12R,12L	IFR1	1979 Demand and Mix	Present	Baseline
14	ASM	12R,12L	12R,12L	VFR	1979 Demand and Mix	Present	A/P Development
15	ASM	12R,12L	12R,12L	IFR1	1979 Demand and Mix	Present	A/P Development
16	ASM	30R,30L	30R,30L	VFR	1979 Demand and Mix	Present	A/P Development
17	ASM	30R,30L	30R,30L	IFR1	1979 Demand and Mix	Present	A/P Development
18	ASM	30R,30L,24	30R,30L	IFR1	1979 Demand and Mix	Present	A/P Development
18a	ASM	30R,30L,24	30R,30L	VFR	1979 Demand and Mix	Present	A/P Development
19	ASM	12R,12L	6,12R,12L	VFR	1979 Demand and Mix	Present	A/P Development
20	ASM	12R,12L	6,12R,12L	IFR1	1979 Demand and Mix	Present	A/P Development
21	ASM	12R,12L,17	12R,12L	VFR	1979 Demand and Mix	Present	A/P Development
22	ASM	12R,12L,17	12R,12L	IFR1	1979 Demand and Mix	Present	A/P Development
23	ASM	30R,30L	30R,30L	IFR1	1979 Demand and Mix	Present	LDA Approach
24	ASM	30R,30L,24	30R,30L	IFR1	1979 Demand and Mix	Present	LDA Approach
24a	ASM	30R,30L,24	30R,30L	VFR	1979 Demand and Mix	Present	LDA Approach
25	ASM	12R,12L	6,12R,12L	IFR1	1979 Demand and Mix	Present	LDA Approach
26	ASM	12R,12L	12R,12L	VFR	1985 Demand and Mix	Present	Baseline
27	ASM	12R,12L	12R,12L	IFR1	1985 Demand and Mix	Present	Baseline
28	ASM	12R,12L	12R,12L	IFR2	1985 Demand and Mix	Present	Baseline
29	ASM	30R,30L	30R,30L	VFR	1985 Demand and Mix	Present	Baseline
30	ASM	30R,30L	30R,30L	IFR1	1985 Demand and Mix	Present	Baseline
31	ASM	30R,30L	30R,30L	IFR2	1985 Demand and Mix	Present	Baseline
32	ASM	30R,30L,24	30R,30L	IFR1	1985 Demand and Mix	Present	Baseline
33	ASM	12R,12L	6,12R,12L	IFR1	1985 Demand and Mix	Present	Baseline
34	ASM	12R,12L,17	12R,12L	IFR1	1985 Demand and Mix	Present	Baseline
35	ASM	12R,12L	12R,12L	VFR	1985 Demand and Mix	Present	A/P Development
36	ASM	12R,12L	12R,12L	IFR1	1985 Demand and Mix	Present	A/P Development
37	ASM	30R,30L	30R,30L	VFR	1985 Demand and Mix	Present	A/P Development
38	ASM	30R,30L	30R,30L	IFR1	1985 Demand and Mix	Present	A/P Development
39	ASM	30R,30L,24	30R,30L	IFR1	1985 Demand and Mix	Present	A/P Development
40	ASM	12R,12L	12R,12L,6	IFR1	1985 Demand and Mix	Present	A/P Development
41	ASM	30R,30L	30R,30L	IFR1	1985 Demand and Mix	Present	LDA Approach
42	ASM	30R,30L,24	30R,30L	IFR1	1985 Demand and Mix	Present	LDA Approach
43	ASM	12R,12L	12R,12L,6	IFR1	1985 Demand and Mix	Present	LDA Approach
44	ASM	12R,12L	12R,12L	VFR	1985 Demand and Mix	Present	Terminal Expansion
45	ASM	30R,30L	30R,30L	IFR1	1985 Increase Heavy Mix	Present	A/P Development
46	ASM	30R,30L,24	30R,30L	IFR1	1985 Increase Heavy Mix	Present	A/P Development
47	ASM	30R,30L	30R,30L	IFR1	1985 Increase Heavy Mix	Present	LDA Approach
48	ASM	30R,30L	30R,30L	IFR1	1985 Decrease GA Mix	Present	A/P Development
49	ASM	30R,30L,24	30R,30L	IFR1	1985 Decrease GA Mix	Present	A/P Development
50	ASM	30R,30L	30R,30L	IFR1	1985 Decrease GA Mix	Present	LDA Approach
51	ASM	12R,12L	12R,12L	VFR	1990 Demand and Mix	Present	A/P Development
52	ASM	12R,12L	12R,12L	IFR1	1990 Demand and Mix	Present	A/P Development
53	ASM	12R,12L	12R,12L	IFR2	1990 Demand and Mix	Present	A/P Development
54	ASM	30R,30L	30R,30L	VFR	1990 Demand and Mix	Present	A/P Development
55	ASM	30R,30L	30R,30L	IFR1	1990 Demand and Mix	Present	A/P Development
56	ASM	30R,30L	30R,30L	IFR2	1990 Demand and Mix	Present	A/P Development
57	ASM	24,30R,30L	30R,30L	IFR1	1990 Demand and Mix	Present	A/P Development
58	ASM	12R,12L	12R,12L,6	IFR1	1990 Demand and Mix	Present	A/P Development
59	ASM	12R,12L,17	12R,12L	IFR1	1990 Demand and Mix	Present	A/P Development
59a	ASM	12R,12L,17	12R,12L	VFR	1990 Demand and Mix	Present	A/P Development
60	ASM	30R,30L	30R,30L	IFR1	1990 Demand and Mix	Present	LDA Approach
61	ASM	24,30R,30L	30R,30L	IFR1	1990 Demand and Mix	Present	LDA Approach
62	ASM	12R,12L	12L,12L,6	IFR1	1990 Demand and Mix	Present	LDA Approach

Table 1 (continued)

REVISED DESCRIPTION OF EXPERIMENTS
Lambert-St. Louis International Airport
Airport Improvement Task Force Delay Studies

Experiment number	Model	Arrival runways	Departure runways	Weather	Demand	ATC	Improvements
63	ASM	12R,12L	12R,12L	VFR	1990 Demand and Mix	Present	Terminal Expansion
64	ASM	12R,12L	12R,12L	VFR	1990 Demand and Mix	Present	Relocate Midcoast Aviation
64a	ASM	12R,12L,17	12R,12L	VFR	1990 Demand and Mix	Present	Relocate Midcoast Aviation
65	ASM	30R,30L	30R,30L	IFR1	1990 Increase Heavy Mix	Present	A/F Development
66	ASM	24,20R,30L	30R,30L	IFR1	1990 Increase Heavy Mix	Present	A/F Development
67	ASM	30R,30L	30R,30L	IFR1	1990 Increase Heavy Mix	Present	LDA Approach
68	ASM	30R,30L	30R,30L	IFR1	1990 Decrease GA Mix	Present	A/F Development
69	ASM	24,30R,30L	30R,30L	IFR1	1990 Decrease GA Mix	Present	A/F Development
69a	ASM	24	24	IFR2	1990 Decrease GA Mix	Present	Baseline
70	ASM	30R,30L	30R,30L	IFR1	1990 Decrease GA Mix	Present	LDA Approach
71	ASM	12R,12L	12R,12L	VFR	1990 Demand and Mix	Future[c]	A/F Development
72	ASM	12R,12L	12R,12L	IFR1	1990 Demand and Mix	Future	A/F Development
73	ASM	12R,12L	12R,12L	IFR2	1990 Demand and Mix	Future	A/F Development
74	ASM	30R,30L	30R,30L	VFR	1990 Demand and Mix	Future	A/F Development
75	ASM	30R,30L	30R,30L	IFR1	1990 Demand and Mix	Future	A/F Development
76	ASM	30R,30L	30R,30L	IFR2	1990 Demand and Mix	Future	A/F Development
77	ASM	30R,30L,24	30R,30L	IFR1	1990 Demand and Mix	Future	A/F Development
78	ASM	12R,12L	12R,12L,6	IFR1	1990 Demand and Mix	Future	A/F Development
79	ASM	12R,12L,17	12R,12L	IFR1	1990 Demand and Mix	Future	A/F Development

a. Airfield Simulation Model.
b. 1979 ATC Separations for VFR and IFR are taken from FAA Document 78-8A.
c. 1990 ATC Separations for VFR and IFR are taken from FAA Document 78-8A.

Table 1a

DESCRIPTION OF EXPERIMENTS
Lambert-St. Louis International Airport
Airport Improvement Task Force Delay Studies

Experiment number	Model	Demand	Improvements	ATC
81	ADM[a]	1979 Demand and Mix	Baseline	Present[b]
81a	ADM	1979 Demand and Mix	Airfield Development	Present
82	ADM	1985 Demand and Mix	Baseline	Present
83	ADM	1985 Demand and Mix	Airfield Development	Present
84	ADM	1985 Demand and Mix	LDA Approach Procedures	Present
85	ADM	1985 Increase Heavy Mix	A/F Development	Present
86	ADM	1985 Decreased GA Mix	A/F Development	Present
87	ADM	1990 Demand and Mix	Baseline	Present
88	ADM	1990 Demand and Mix	Airfield Development	Present
89	ADM	1990 Demand and Mix	LDA Approach Procedures	Present
90	ADM	1990 Increase Heavy Mix	Airfield Development	Present
91	ADM	1990 Decreas GA Mix	Airfield Development	Present
92	ADM	1990 Demand and Mix	Airfield Development	Future[c]
93	ADM	1990 Increase Heavy Mix	Airfield Development	Future
94	ADM	1990 Decrease GA Mix	Airfield Development	Future

a. Annual Delay Model.
b. 1979 ATC Separations for VFR and IFR are taken from FAA Document 78-8A.
c. 1990 ATC Separations for VFR and IFR are taken from FAA Document 78-8A.

ATTACHMENT B

INPUT DATA SUMMARY

FOUR BASELINE SCENARIOS - AIRFIELD SIMULATION

Lambert-St. Louis International Airport

St. Louis
Airport Improvement Task Force Delay Studies

Prepared by

Peat, Marwick, Mitchell & Co.
San Francisco, California

May 1980

REVISED INPUT DATA SUMMARY
FOUR BASELINE SCENARIOS--AIRFIELD SIMULATION

Summaries of the data inputs necessary to run the airfield simulation model have been included for the following experiments:

- Experiment 1--Arrivals and Departures on Runways 12R and 12L, VFR Baseline, 1979 Demand and Mix, Present ATC Procedures
- Experiment 4--Arrivals and Departures on Runways 30R and 30L, VFR Baseline, 1979 Demand and Mix, Present ATC Procedures
- Experiment 7A--Arrivals on Runways 30R, 30L, and 24, Departures on Runways 30R and 30L, VFR Baseline, 1979 Demand and Mix, Present ATC Procedures
- Experiment 12--Arrivals on Runways 12R, 12L, and 17, Departures on Runways 12R and 12L, VFR Baseline, 1979 Demand and Mix, Present ATC Procedures

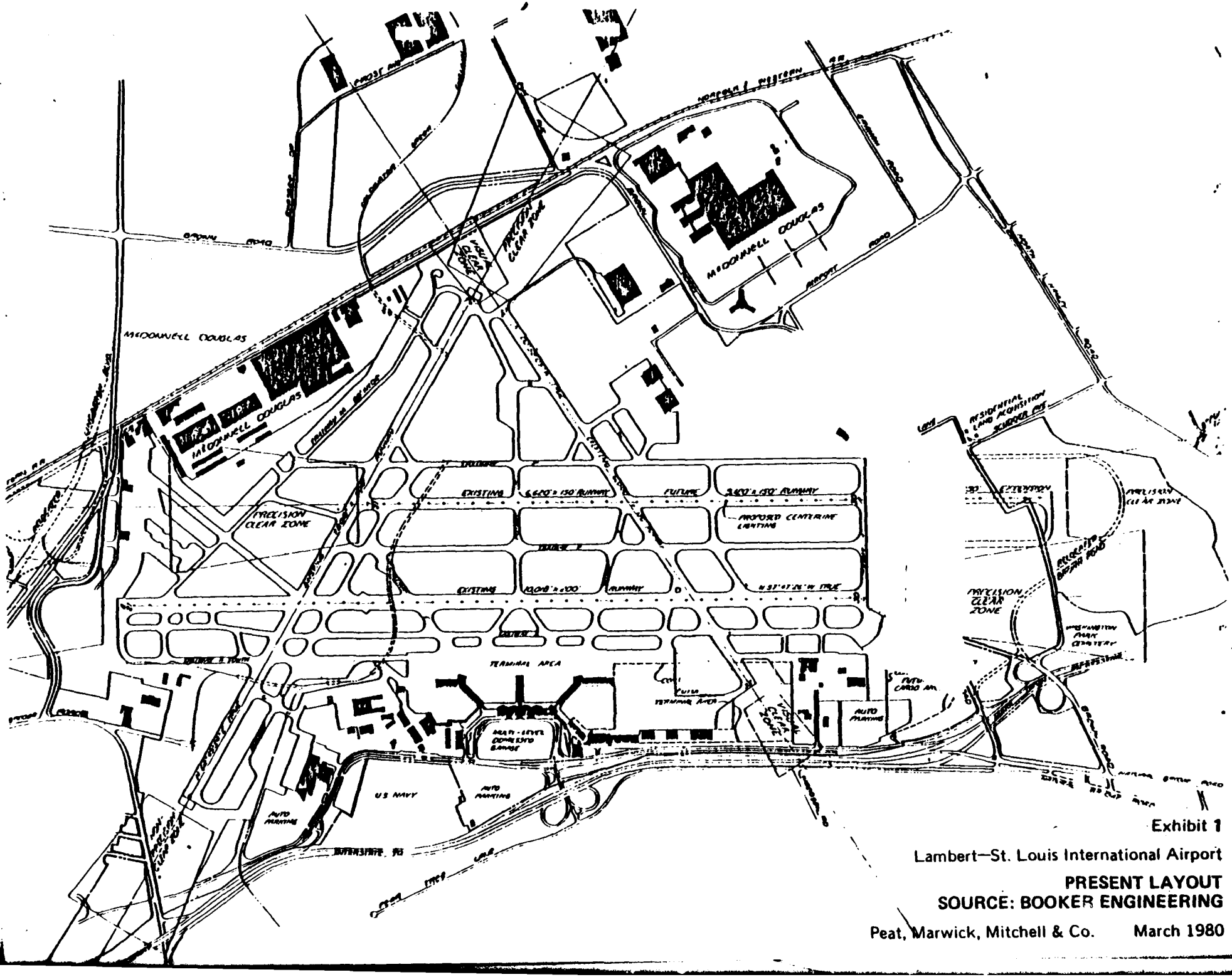


Exhibit 1

Lambert—St. Louis International Airport

PRESENT LAYOUT
SOURCE: BOOKER ENGINEERING

Peat, Marwick, Mitchell & Co. March 1980

Experiment 1--Runways 12R and 12L
VFR Baseline
1979 Demand and Mix
Present ATC Procedures

A. Logistics

1. Title: Lambert-St. Louis International Airport
Experiment 1

2. Random Number Seeds: 2017, 3069, 4235, 5873, 6981, 7137, 8099, 9355, 0123, 1985

3. Start and Finish Times: 0700 to 2200

4. Print Options: Standard options including summary outputs

5. Airline Names:
AA - American
AL - USAir
BN - Braniff
DL - Delta
EA - Eastern
FL - Frontier
NW - Northwest Orient
OZ - Ozark
RC - Republic
TI - Texas International
TW - Trans World Airlines
AT - Air Taxi
AF - Air Freight
ML - Military
GA - General Aviation
SS - Supplemental

6. Processing Options: COMPUTE

7. Truncation Limits: ± 2 standard deviations

8. Time Switch: Not applicable

B. Airfield Physical Characteristics

9. Airfield Network: See Exhibit 1

10. Number of Runways: 2

11. Runway Identification: 12R and 12L

12. Departure Runway End Links:
for 12R - Taxiway A
for 12L - Taxiway C

13. Runway Crossing Links Clearance Times (seconds):

Runway	Crossing link	Crossing clearance times: Arrival on runway D	C	B	A	Departure on runway D	C	B	A	Arrival on final D	C	B	A
12R	R	61	57	60	50	47	47	42	42	20	20	20	20
12R	G	57	56	60	50	38	38	42	42	20	20	20	20
12R	E	34	38	44	50	27	27	29	32	20	20	20	20
12R	Midcoast	61	57	60	50	43	43	42	42	20	20	20	20
12R	C	29	29	37	44	16	16	18	20	20	20	20	20
12R	B	46	46	55	50	34	34	37	39	20	20	20	20
12L	17-35	33	33	41	48	27	27	28	30	20	20	20	20
12L	6-24	15	15	15	15	15	15	15	15	20	20	20	20

14. Exit Taxiway Locations:

Runway	Exit	Feet from threshold
12R	R	9,590
12R	17-35	7,280
12R	J	6,975
12R	G	6,005
12R	B	4,910
12R	E	3,510
12L	R	6,630
12L	N	4,560
12L	G	3,465
12L	17-35	3,465
12L	B	1,945

15. Holding Area-Link Number: 47

16. Airline Gates:

American -	3
Braniff -	1
Delta -	2
Eastern -	1,2
Frontier -	4
Northwest Orient -	6
USAir -	1
Ozark -	6
Republic -	5
TI -	1
TWA -	5
Air Taxi -	1,3
Air Freight -	6
Supplemental -	6

17. General Aviation Basing Areas: 7, 8, 9, 10, 11, 12, 13, and 14

C. ATC Procedures

18. Aircraft Separations:

Arrival-Arrival Separation-VFR (nautical miles)

		Trail Aircraft Class			
		A	B	C	D
Lead Aircraft Class	A	2.7	2.9	3.0	3.1
	B	2.7	2.9	3.0	3.1
	C	3.5	3.7	3.0	3.1
	D	5.3	5.5	4.7	3.9

Departure-Departure Separations-VFR (seconds)

		Trail Aircraft Class			
		A	B	C	D
Lead Aircraft Class	A	30	30	45	50
	B	35	40	45	50
	C	45	45	60	60
	D	120	120	120	90

Departure-Arrival Separation (nautical miles)

		Trail Aircraft Class			
		A	B	C	D
Lead Aircraft Class	A	1.1	1.4	1.5	1.6
	B	1.1	1.4	1.5	1.6
	C	1.8	1.8	1.8	1.8
	D	1.8	1.8	1.8	1.8

Aircraft operations on the parallel runways are dependent when there is a heavy aircraft on either runway.

19. Route Data: See Exhibits 2a and 2b.

20. Two-Way Path Data: See Exhibits 2a and 2b.

21. Common Approach Paths:

	Aircraft class	Length (nautical miles)
VFR	A	2.0
	B	2.0
	C	6.0
	D	6.0

22. Vectoring Delays: Report sum of speed control, vectoring, and holding delay as one total.

23. Departure Runway Queue Control: Not used.

24. Gate Hold Control: When Runway 12L queue exceeds 6, when Runway 12R queue exceeds 10.

25. Departure Airspace Constraints: Specified in separations and no aircraft held at gate due to airspace constraints.

26. Runway Interarrival Gap: Arrival separations increase from those specified in No. 18 to 8 miles when departure queue exceeds 6 on Runway 12R and exceeds 4 on Runway 12L.

27. Runway Crossing Delay Control: Arrival separations increase from those in No. 18 to 5 miles when crossing queue exceeds 4 on Runway 12R and exceeds 2 on Runway 12L.

28. Exit Taxiway Utilization (percent):

Runway	Class	17-35	J	G	B	E
12R	A					100
	B	17	6	13	46	18
	C	14	17	39	28	2
	D	15	29	42	14	

		R	N	G	17-35	B
12L	A			8	9	83
	B		16	40	42	2
	C	65	33		2	
	D	100				

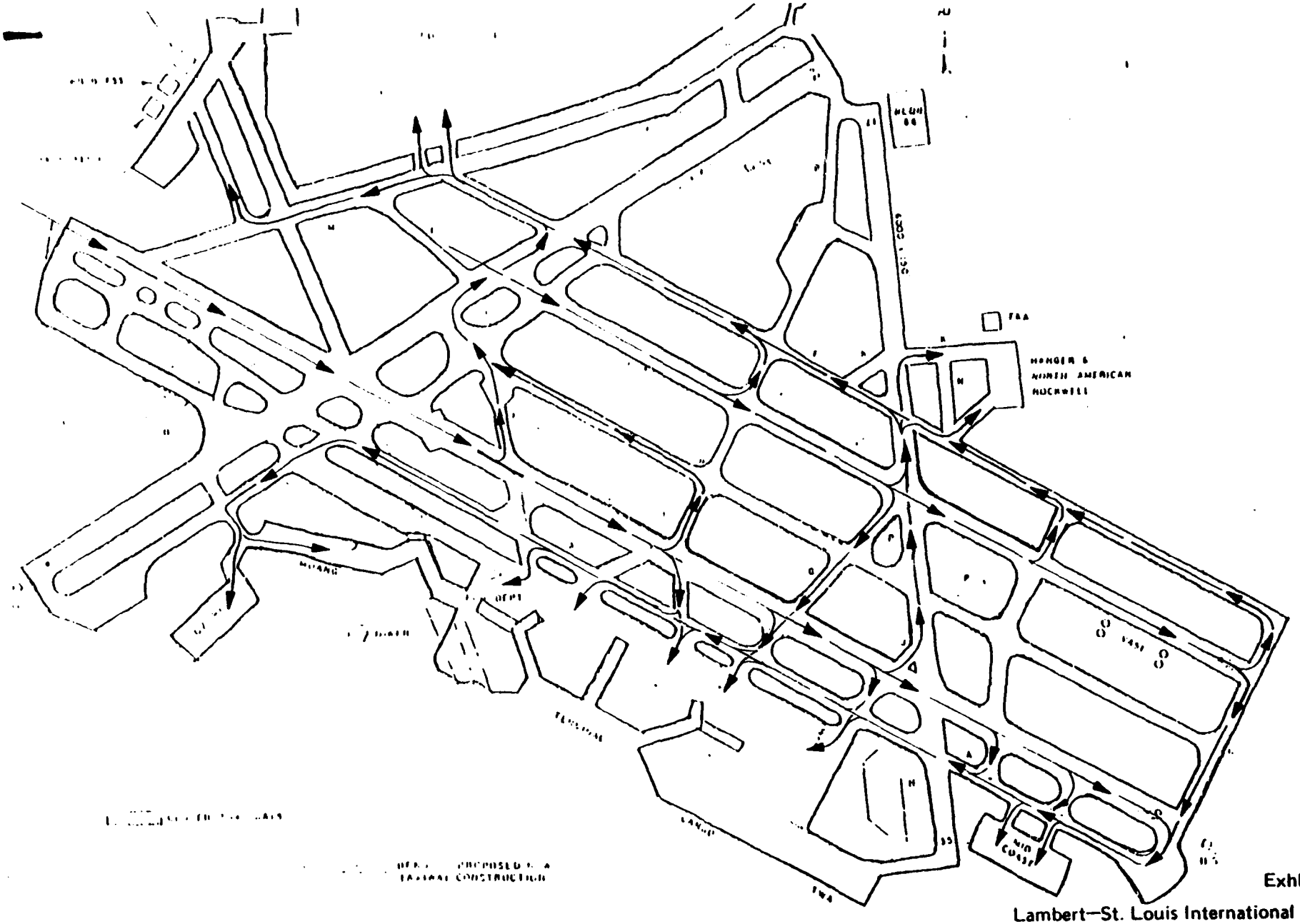


Exhibit 2A

Lambert—St. Louis International Airport

PRESENT CONFIGURATION
FLOW DIAGRAM
ARRIVALS ON RUNWAYS 12R AND 12L

Peat, Marwick, Mitchell & Co. March 1980

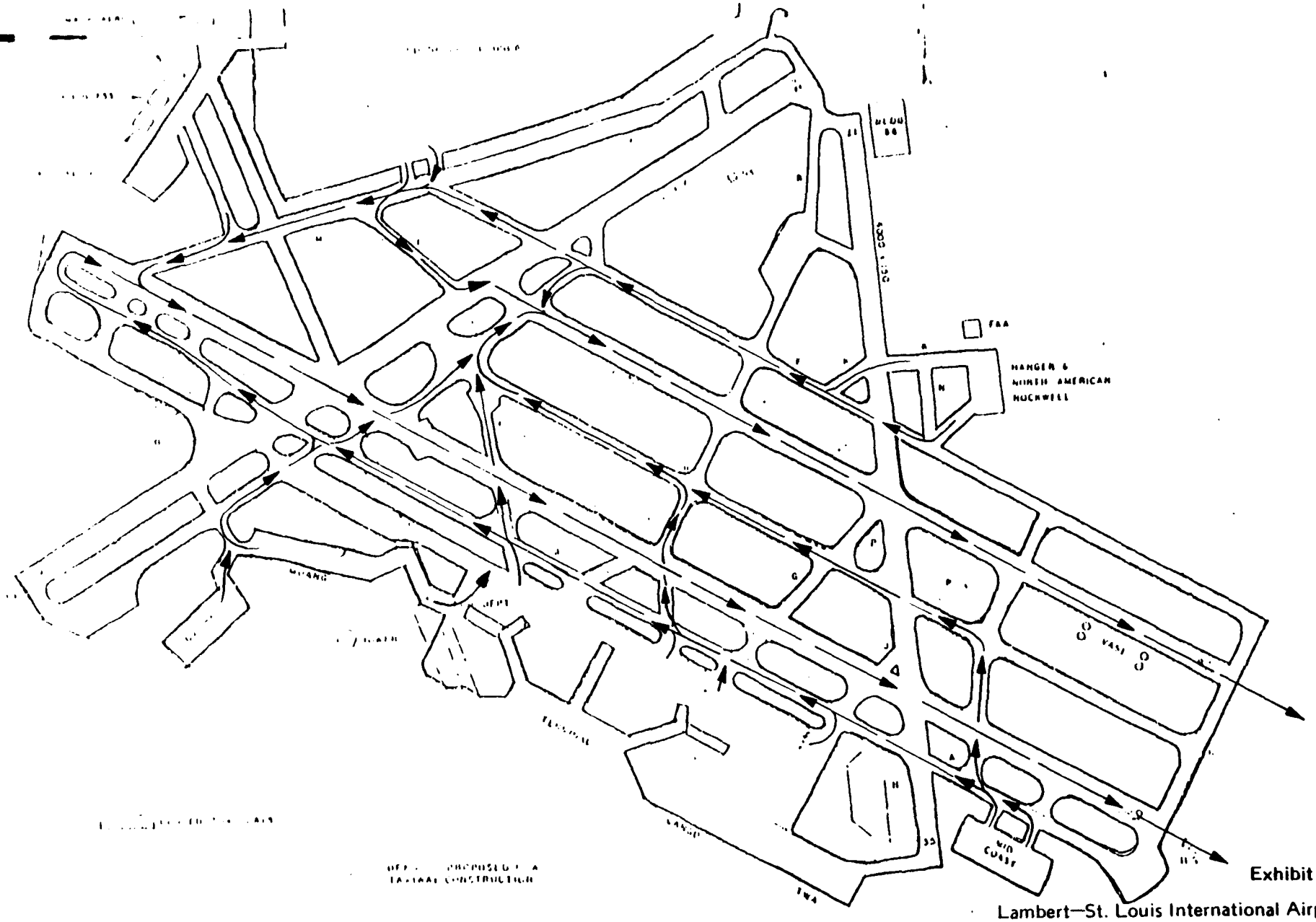


Exhibit 2B

Lambert—St. Louis International Airport

PRESENT CONFIGURATION
FLOW DIAGRAM
DEPARTURES ON RUNWAYS 12R AND 12L

Peat, Marwick, Mitchell & Co. March 1980

29. Arrival Runway Occupancy Times (seconds):

Runway	Class	17-35	J	G	B	E	Weighted average
12R	A					50	50
	B	60	60	53	50	44	52
	C	57	56	50	41	38	50
	D	61	54	47	40		56

		R	N	G	17-35	B	Weighted average
12L	A			48	48	34	36
	B		52	42	42	27	43
	C	62	43		34		55
	D	62					62

30. Touch and Go Occupancy Times: No touch and go's.

31. Departure Runway Occupancy Times (seconds):

Aircraft class	Mean	Standard deviation
A	34	4
B	34	4
C	39	4
D	39	4

32. Taxi Speeds (mph): 5, 10, 15, 20, 25, and 35 (Exhibit 2c).

33. Approach Speeds (knots):

Aircraft class	Mean	Standard deviation
A	95	10
B	120	10
C	130	10
D	140	10

34. Gate Service Times: To be supplied by airport task force.

35. Airspace Travel Times: See Table 2.

36. Runway Crossing Times: 20 seconds.

37. Lateness Distribution: To be supplied by airport task force.

38. Schedule: 1979 Demand and Mix.

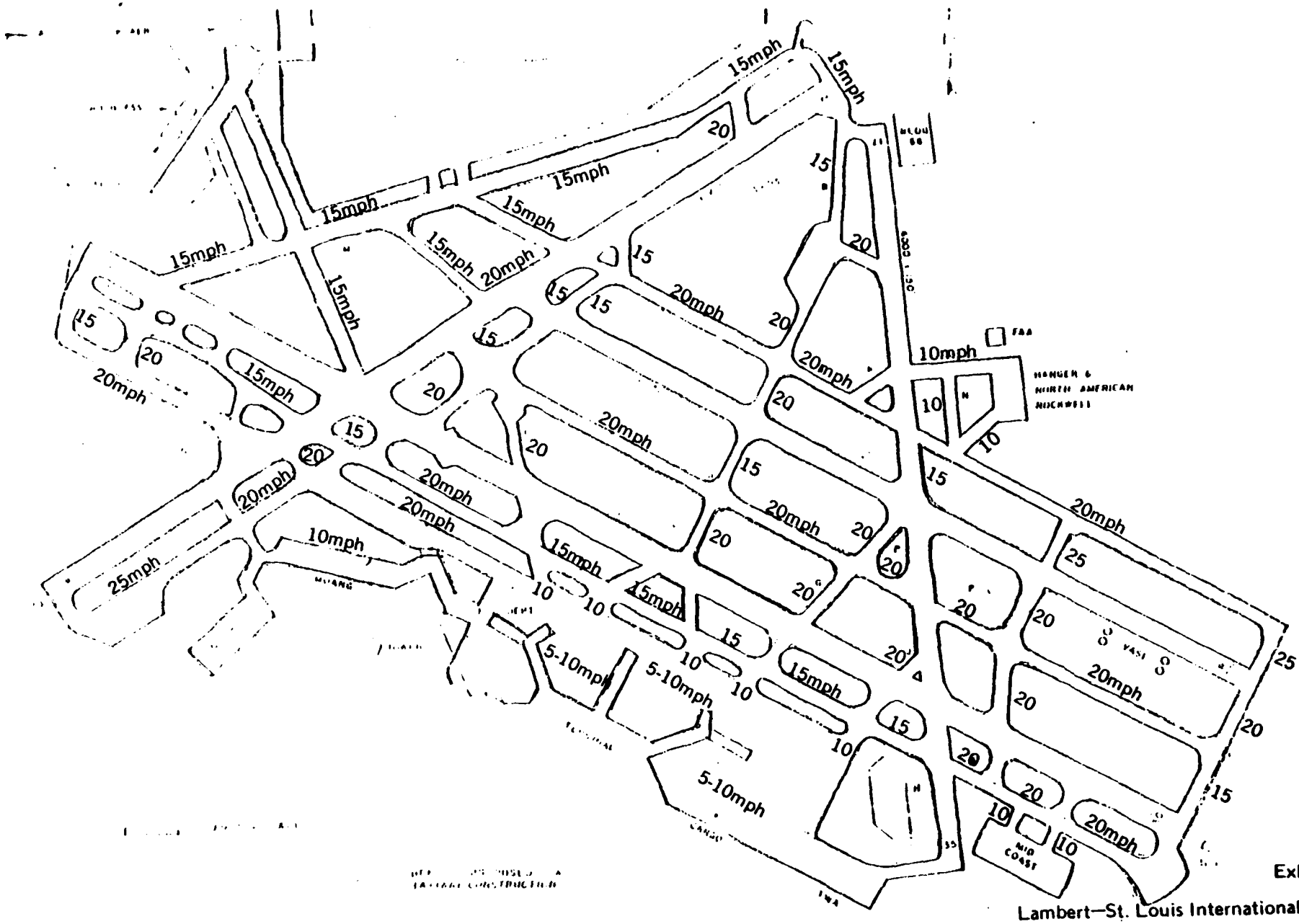


Exhibit 2C

Lambert—St. Louis International Airport

GENERALIZED TAXIWAY SPEEDS FOR ARRIVALS AND DEPARTURES ON RUNWAYS 12R AND 12L

Peat, Marwick, Mitchell & Co. March 1980

Table 2

ARRIVAL FIX TRAVEL TIME--EXPERIMENT 1
Lambert-St. Louis International Airport
Airport Improvement Task Force Delay Studies

Runway name	Fix code	Class	Travel time (minutes)
12R	K	1	13.0
12R	K	2	13.0
12R	K	3	15.0
12R	K	4	--
12R	B	1	13.0
12R	B	2	13.5
12R	B	3	16.5
12R	B	4	17.0
12R	F	1	11.0
12R	F	2	11.0
12R	F	3	11.5
12R	F	4	--
12R	V	1	11.0
12R	V	2	11.0
12R	V	3	11.5
12R	V	4	--
12L	K	1	--
12L	K	2	13.0
12L	K	3	14.5
12L	K	4	17.0
12L	B	1	--
12L	B	2	13.0
12L	B	3	14.5
12L	B	4	--
12L	F	1	--
12L	F	2	11.0
12L	F	3	15.5
12L	F	4	15.5
12L	V	1	--
12L	V	2	10.0
12L	V	3	14.5
12L	V	4	14.5

Experiment 4--Runways 30R and 30L
VFR Baseline
1979 Demand and Mix
Present ATC Procedures

A. Logistics

1. Title: Lambert-St. Louis International Airport Experiment 4

2. Random Number Seeds: 2017, 3069, 4235, 5873, 6981, 7137, 8099, 9355, 0123, 1985

3. Start and Finish Times: 0700 to 2200

4. Print Options: Standard options including summary outputs

5. Airline Names:
AA - American
AL - USAir
BN - Braniff
DL - Delta
EA - Eastern
FL - Frontier
NW - Northwest Orient
OZ - Ozark
RC - Republic
TI - Texas International
TW - Trans World Airlines
AT - Air Taxi
AF - Air Freight
ML - Military
GA - General Aviation
SS - Supplemental

6. Processing Options: COMPUTE

7. Truncation Limits: ± 2 standard deviations

8. Time Switch: Not applicable

B. Airfield Physical Characteristics

9. Airfield Network: See Exhibit 1

10. Number of Runways: 2

11. Runway Identification: 30R and 30L

12. Departure Runway End Links:
30R - Taxiway R
30L - Taxiway R

13. Runway Crossing Links Clearance Times (seconds):

Runway	Crossing link	Crossing clearance times: Arrival on runway D	C	B	A	Departure on runway D	C	B	A	Arrival on final D	C	B	A
30R	B	45	45	52	46	32	32	37	42	20	20	20	20
30R	17-35	32	32	38	46	27	27	28	32	20	20	20	20
30R	6-24	58	58	52	46	42	42	42	42	20	20	20	20
30L	B	45	45	54	52	32	32	37	42	20	20	20	20
30L	E	57	57	54	52	40	40	42	42	20	20	20	20
30L	17-35	24	24	32	38	22	22	23	25	20	20	20	20
30L	Midcoast	18	18	24	30	18	18	18	19	20	20	20	20
30L	G	35	35	43	52	28	28	30	34	20	20	20	20

14. Exit Taxiway Locations:

Runway	Exit	Feet from threshold
30R	6-24	6,990
30R	B	4,745
30R	C	3,325
30R	17-35	3,225
30L	6-24	7,780
30L	E	6,200
30L	B-left	4,800
30L	B-right	4,800
30L	G	3,705
30L	J	2,735
30L	17-35	2,430

15. Holding Area-Link Number: 47

16. Airline Gates:

American -	3
Braniff -	1
Delta -	2
Eastern -	1,2
Frontier -	4
Northwest Orient -	6
USAir -	1
Ozark -	6
Republic -	5
TI -	1
TWA -	5
Air Taxi -	1,3
Air Freight -	6
Supplemental -	6

17. General Aviation Basing Areas: 7, 8, 9, 10, 11, 12, 13, and 14

C. ATC Procedures

18. Aircraft Separations:

Arrival-Arrival Separation-VFR (nautical miles)

		Trail Aircraft Class			
		A	B	C	D
Lead Aircraft Class	A	2.7	2.9	3.0	3.1
	B	2.7	2.9	3.0	3.1
	C	3.5	3.7	3.0	3.1
	D	5.3	5.5	4.7	3.9

Departure-Departure Separations-VFR (seconds)

		Trail Aircraft Class			
		A	B	C	D
Lead Aircraft Class	A	30	30	45	50
	B	35	40	45	50
	C	45	45	60	60
	D	120	120	120	90

Departure-Arrival Separation (nautical miles)

		Trail Aircraft Class			
		A	B	C	D
Lead Aircraft Class	A	1.1	1.4	1.5	1.6
	B	1.1	1.4	1.5	1.6
	C	1.8	1.8	1.8	1.8
	D	1.8	1.8	1.8	1.8

Aircraft operations on the parallel runways are dependent when there is a heavy aircraft on either runway.

19. Route Data: See Exhibits 3a and 3b.

20. Two-Way Path Data: See Exhibits 3a and 3b.

21. Common Approach Paths:

	Aircraft class	Length (nautical miles)
VFR	A	2.0
	B	2.0
	C	6.0
	D	6.0

22. Vectoring Delays: Report sum of speed control, vectoring, and holding delay as one total.

23. Departure Runway Queue Control: Not used.

24. Gate Hold Control: When Runway 30R queue exceeds 6, when Runway 30L queue exceeds 10.

25. Departure Airspace Constraints: Specified in separations and no aircraft held at gate due to airspace constraints.

26. Runway Interarrival Gap: Arrival separations increase from those specified in No. 18 to 8 miles when departure queue exceeds 6 on Runway 30L and exceeds 4 on Runway 30R.

27. Runway Crossing Delay Control: Arrival separations increase from those in No. 18 to 5 miles when crossing queue exceeds 4 on Runway 30L and exceeds 2 on Runway 30R.

28. Exit Taxiway Utilization (percent):

Runway	Class	Exit			
		B	G	24-6	17-35
30R	A				100
	B	28	36		36
	C	34	2	64	
	D	4		96	

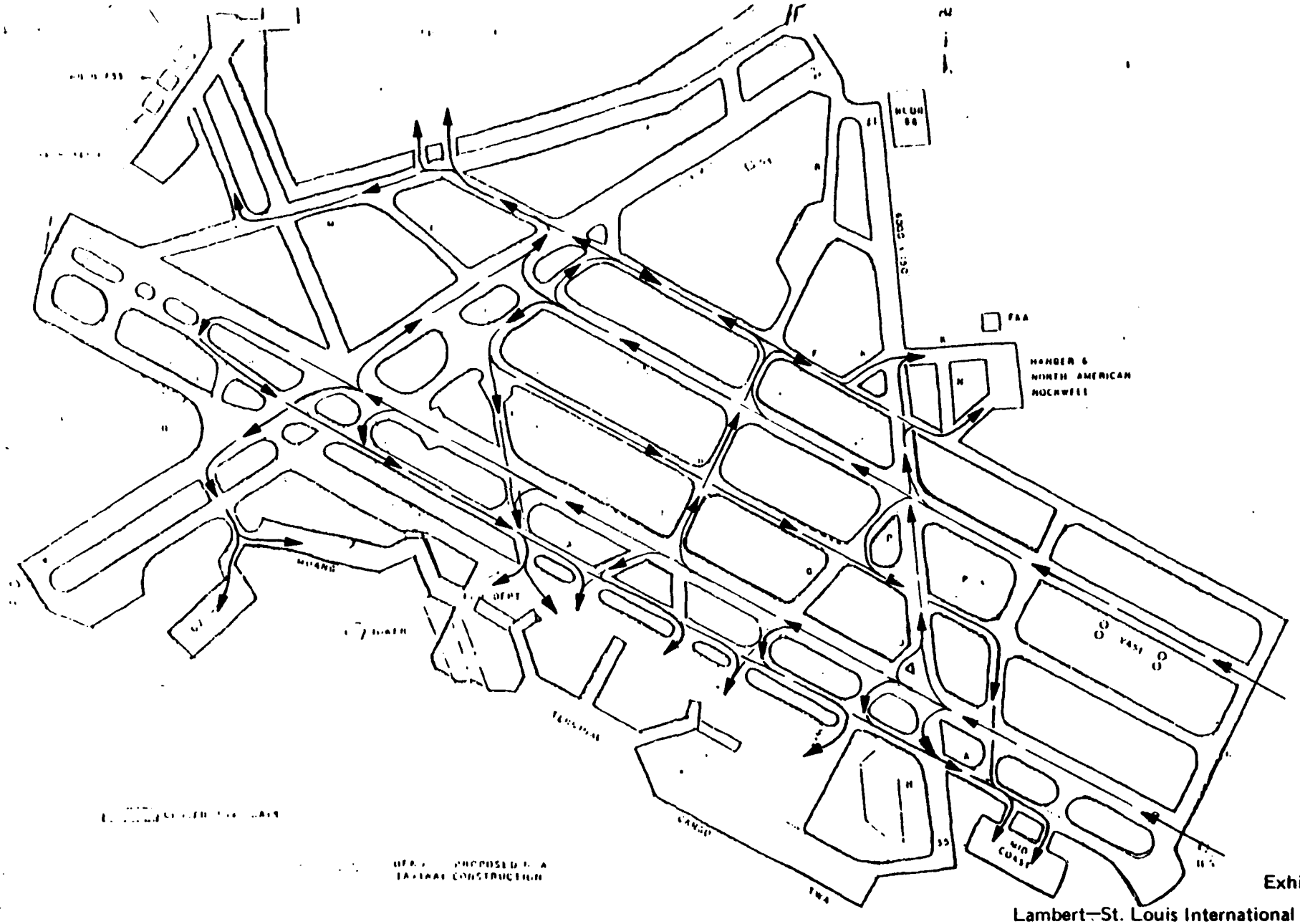


Exhibit 3A

Lambert—St. Louis International Airport

PRESENT CONFIGURATION
FLOW DIAGRAM
ARRIVALS ON RUNWAYS 30R AND 30L

Peat, Marwick, Mitchell & Co. March 1980

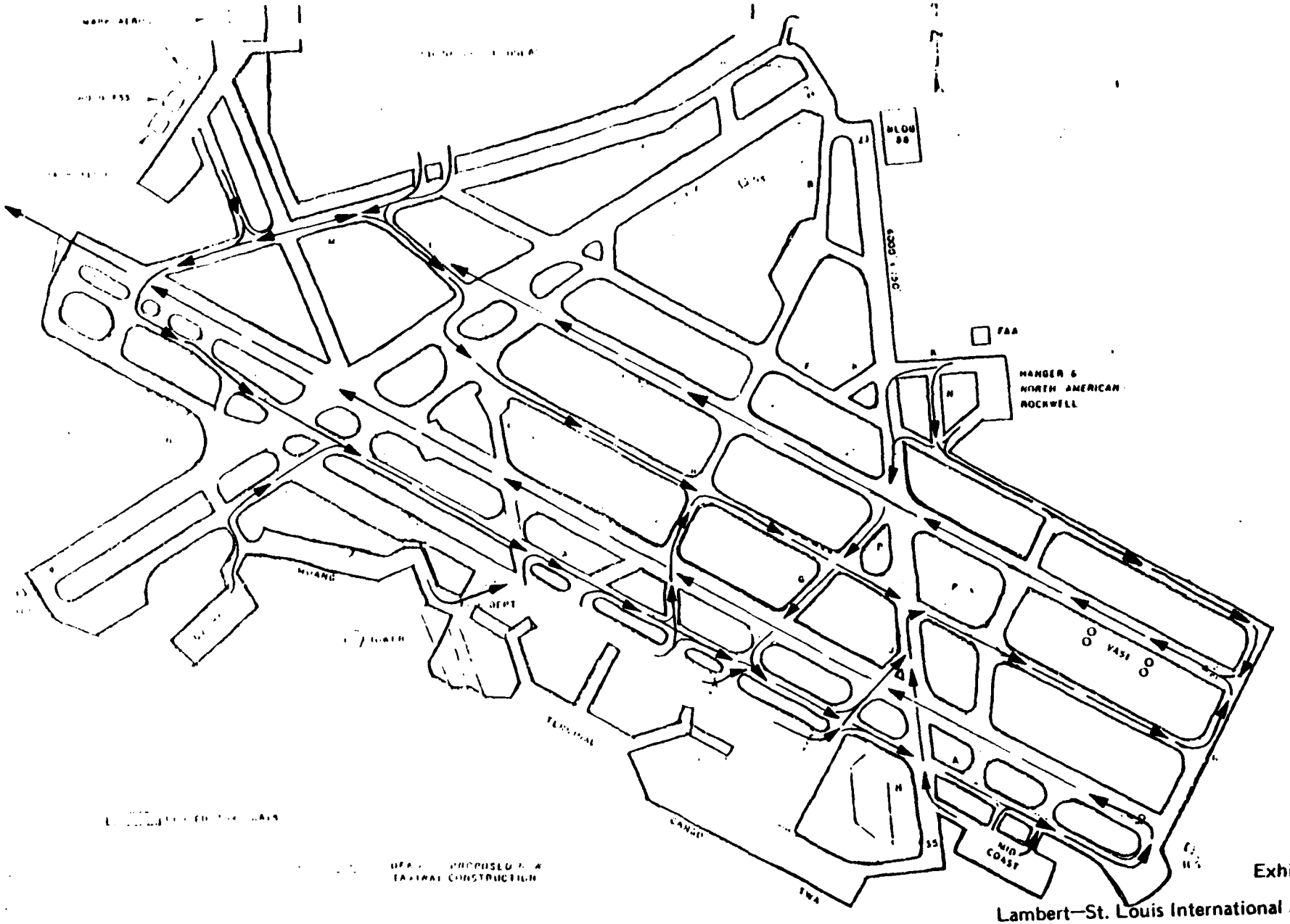


Exhibit 3B

Lambert—St. Louis International Airport

PRESENT CONFIGURATION
FLOW DIAGRAM
DEPARTURES ON RUNWAYS 30R AND 30L

Peat, Marwick, Mitchell & Co. March 1980

Runway	Class	Exit						
		6-24	E	B-left	B-right	G	J	17-35
30L	A					1	4	95
	B			7		73	14	6
	C	16	44	28	12			
	D	17	78	5				

29. Arrival Runway Occupancy Times (seconds):

Runway	Class	Exit				Weighted average
		B	G	24-6	17-35	
30R	A				46	46
	B	52	40		38	43
	C	45	45	58		53
	D	45		58		57

		6-24	E	B-left	B-right	G	J	17-35	Weighted average
30L	A					52	41	38	38
	B			54		43	34	32	42
	C	61	52	40	41				49
	D	72	57	41					59

30. Touch and Go Occupancy Times: No touch and go's.

31. Departure Runway Occupancy Times (seconds):

Aircraft class	Mean	Standard deviation
A	34	4
B	34	4
C	39	4
D	39	4

32. Taxi Speeds (mph): 5, 10, 15, 20, 25, and 35 (see Exhibit 3c).

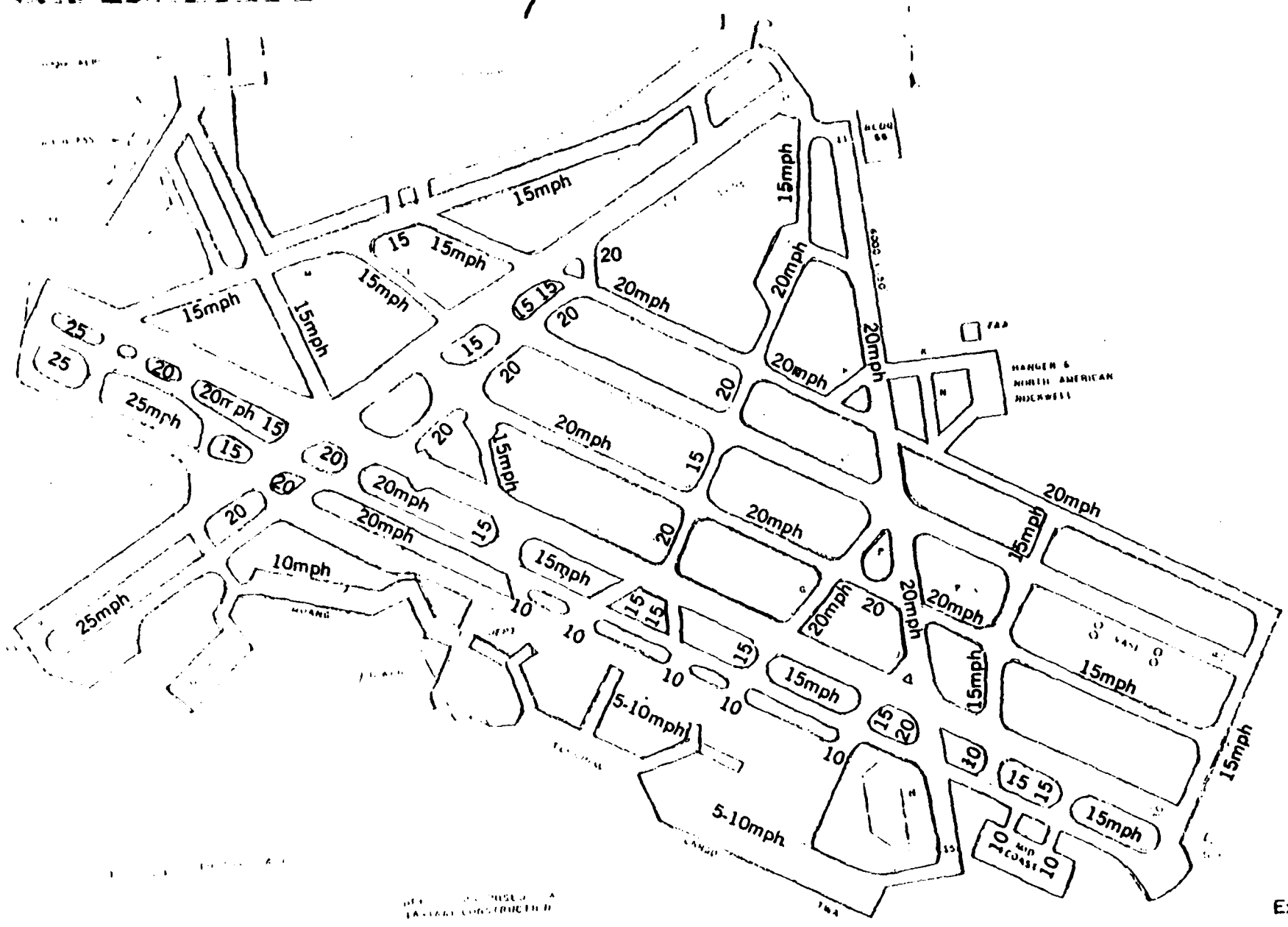


Exhibit 3C

Lambert—St. Louis International Airport

GENERALIZED TAXIWAY SPEEDS FOR ARRIVALS AND DEPARTURES ON RUNWAYS 30R AND 30L

Peat, Marwick, Mitchell & Co. March 1980

33. Approach Speeds (knots):

Aircraft class	Mean	Standard deviation
A	95	10
B	120	10
C	130	10
D	140	10

34. Gate Service Times: To be supplied by airport task force.

35. Airspace Travel Times: See Table 3.

36. Runway Crossing Times: 20 seconds.

37. Lateness Distribution: To be supplied by airport task force.

38. Schedule: 1979 Demand and Mix.

Table 3

ARRIVAL FIX TRAVEL TIME--EXPERIMENT 4
Lambert-St. Louis International Airport
Airport Improvement Task Force Delay Studies

Runway name	Fix code	Class	Travel time (minutes)
30R	K	1	--
30R	K	2	11.0
30R	K	3	14.5
30R	K	4	15.0
30R	B	1	--
30R	B	2	12.0
30R	B	3	14.0
30R	B	4	--
30R	F	1	--
30R	F	2	13.0
30R	F	3	17.0
30R	F	4	--
30R	V	1	11.0
30R	V	2	--
30R	V	3	13.0
30R	V	4	--
30L	K	1	11.0
30L	K	2	11.0
30L	K	3	11.0
30L	K	4	--
30L	B	1	9.5
30L	B	2	10.5
30L	B	3	12.5
30L	B	4	--
30L	F	1	13.0
30L	F	2	13.0
30L	F	3	14.5
30L	F	4	15.5
30L	V	1	13.0
30L	V	2	13.5
30L	V	3	17.0
30L	V	4	--

Experiment 7A--Runways 30R, 30L, and 24
VFR Baseline
1979 Demand and Mix
Present ATC Procedures

A. Logistics

1. Title: Lambert-St. Louis International Airport Experiment 7A

2. Random Number Seeds: 2017, 3069, 4235, 5873, 6981, 7137, 8099, 9355, 0123, 1985

3. Start and Finish Times: 0700 to 2200

4. Print Options: Standard options including summary outputs

5. Airline Names:
AA - American
AL - USAir
BN - Braniff
DL - Delta
EA - Eastern
FL - Frontier
NW - Northwest Orient
OZ - Ozark
RC - Republic
TI - Texas International
TW - Trans World Airlines
AT - Air Taxi
AF - Air Freight
ML - Military
GA - General Aviation
SS - Supplemental

6. Processing Options: COMPUTE

7. Truncation Limits: ± 2 standard deviations

8. Time Switch: Not applicable

B. Airfield Physical Characteristics

9. Airfield Network: See Exhibit 1

10. Number of Runways: 3

11. Runway Identification: 30R, 30L, and 24

12. Departure Runway End Links:
30R - Taxiway R
30L - Taxiway R

13. Runway Crossing Links Clearance Times (seconds):

Runway	Crossing link	Crossing clearance times: Arrival on runway D	C	B	A	Departure on runway D	C	B	A	Arrival on final D	C	B	A
30R	17-35	32	32	38	46	27	27	28	32	20	20	20	20
30R	B	45	45	52	46	32	32	37	42	20	20	20	20
30R	G	32	32	38	46	27	27	28	32	20	20	20	20
30R	J	26	26	34	41	24	25	25	27	20	20	20	20
30R	B	45	45	54	52	32	32	37	43	20	20	20	20
30L	Midcoast	18	18	24	30	18	18	18	19	20	20	20	20
30L	E	57	57	54	52	40	40	42	42	20	20	20	20
30L	17-35	24	24	32	38	22	22	23	25	20	20	20	20
30L	G	35	35	43	52	28	28	30	34	20	20	20	20
24	A	67	67	57	48	0	0	0	0	20	20	20	20
24	F	25	25	33	39	0	0	0	0	20	20	20	20
24	I	34	34	42	48	0	0	0	0	20	20	20	20

14. Exit Taxiway Locations:

Runway	Exit	Feet from threshold
30R	C	6,563
30R	B	4,745
30R	G	3,325
30R	17-35	3,225
30L	E	6,200
30L	B-left	4,800
30L	B-right	4,800
30L	G	3,705
30L	J	2,735
30L	17-35	2,430
24	C	7,620
24	L	6,035
24	A	5,190
24	P	3,800

15. Holding Area-Link Number: 47

16. Airline Gates:

American -	3
Braniff -	1
Delta -	2
Eastern -	1,2
Frontier -	4
Northwest Orient -	6
USAir -	1
Ozark -	6
Republic -	5
TI -	1
TWA -	5
Air Taxi -	1,3
Air Freight -	6
Supplemental -	6

17. General Aviation Basing Areas: 7, 8, 9, 10, 11, 12, 13, and 14

C. ATC Procedures

18. Aircraft Separations:

Arrival-Arrival Separation-VFR (nautical miles)

		Trail Aircraft Class			
		A	B	C	D
Lead Aircraft Class	A	2.7	2.9	3.0	3.1
	B	2.7	2.9	3.0	3.1
	C	3.5	3.7	3.0	3.1
	D	5.3	5.5	4.7	3.9

Departure-Departure Separations-VFR (seconds)

		Trail Aircraft Class			
		A	B	C	D
Lead Aircraft Class	A	30	30	45	50
	B	35	40	45	50
	C	45	45	60	60
	D	120	120	120	90

Departure-Arrival Separation (nautical miles)

		Trail Aircraft Class			
		A	B	C	D
Lead Aircraft Class	A	1.1	1.4	1.5	1.6
	B	1.1	1.4	1.5	1.6
	C	1.8	1.8	1.8	1.8
	D	1.8	1.8	1.8	1.8

Arrival-Arrival Separation Between Lead Aircraft on Runway 24 and Trail Aircraft on Runway 30L (nautical miles)

		Trail Aircraft Class			
		A	B	C	D
Lead Aircraft Class	A	0	0	0	0
	B	0	0	0	0
	C	0	0	0	3.1
	D	0	0	0	3.9

Arrival-Arrival Separation Between Lead Aircraft on Runway 30L and Trail Aircraft on Runway 24 (nautical miles)

		Trail Aircraft Class			
		A	B	C	D
Lead Aircraft Class	A	0	0	0	0
	B	0	0	0	0
	C	0	0	0	0
	D	0	0	4.7	3.9

Arrival-Departure Separation Between Lead Aircraft on Runway 24 and Trail Aircraft on Runway 30R (seconds)

		Trail Aircraft Class			
		A	B	C	D
Lead Aircraft Class	A	44	44	44	44
	B	37	37	37	37
	C	24	24	24	24
	D	20	20	20	20

Arrival-Departure Separation Between Lead Aircraft on Runway 24 and Trail Aircraft on Runway 30L (seconds)

		Trail Aircraft Class			
		A	B	C	D
Lead Aircraft Class	A	0	0	0	0
	B	0	0	0	0
	C	45	45	45	45
	D	45	45	45	45

Departure-Arrival Separation Between Lead Aircraft on Runway 30R and Trail Aircraft on Runway 24 (nautical miles)

		Trail Aircraft Class			
		A	B	C	D
Lead Aircraft Class	A	1.6	2.0	2.2	2.3
	B	1.6	2.0	2.2	2.3
	C	1.6	2.0	2.2	2.3
	D	1.6	2.0	2.2	2.3

Departure-Arrival Separation Between Lead Aircraft on Runway 30L and Trail Aircraft on Runway 24 (nautical miles)

		Trail Aircraft Class			
		A	B	C	D
Lead Aircraft Class	A	0	0	2.2	2.3
	B	0	0	2.2	2.3
	C	0	0	2.2	2.3
	D	0	0	2.2	2.3

19. Route Data: See Exhibits 4a and 4b.

20. Two-Way Path Data: See Exhibits 4a and 4b.

21. Common Approach Paths:

	Aircraft class	Length (nautical miles)
VFR	A	2.0
	B	2.0
	C	6.0
	D	6.0

22. Vectoring Delays: Report Sum of speed control, vectoring, and holding delay as one total.

23. Departure Runway Queue Control: Not used.

24. Gate Hold Control: When Runway 30R queue exceeds 6, [illegible] 30L exceeds 10.

25. Departure Airspace Constraints: Specified in separations and no aircraft held at gate due to airspace constraints.

26. Runway Interarrival Gap: Arrival separations increase from those specified in #18 to 8 miles when departure queue exceeds 6 on Runway 30L and 4 on Runway 30R.

27. Runway Crossing Delay Control: Arrival separations increase from those in #18 to 5 miles when crossing queue exceeds 4 on Runway 30L and 2 on Runway 30R.

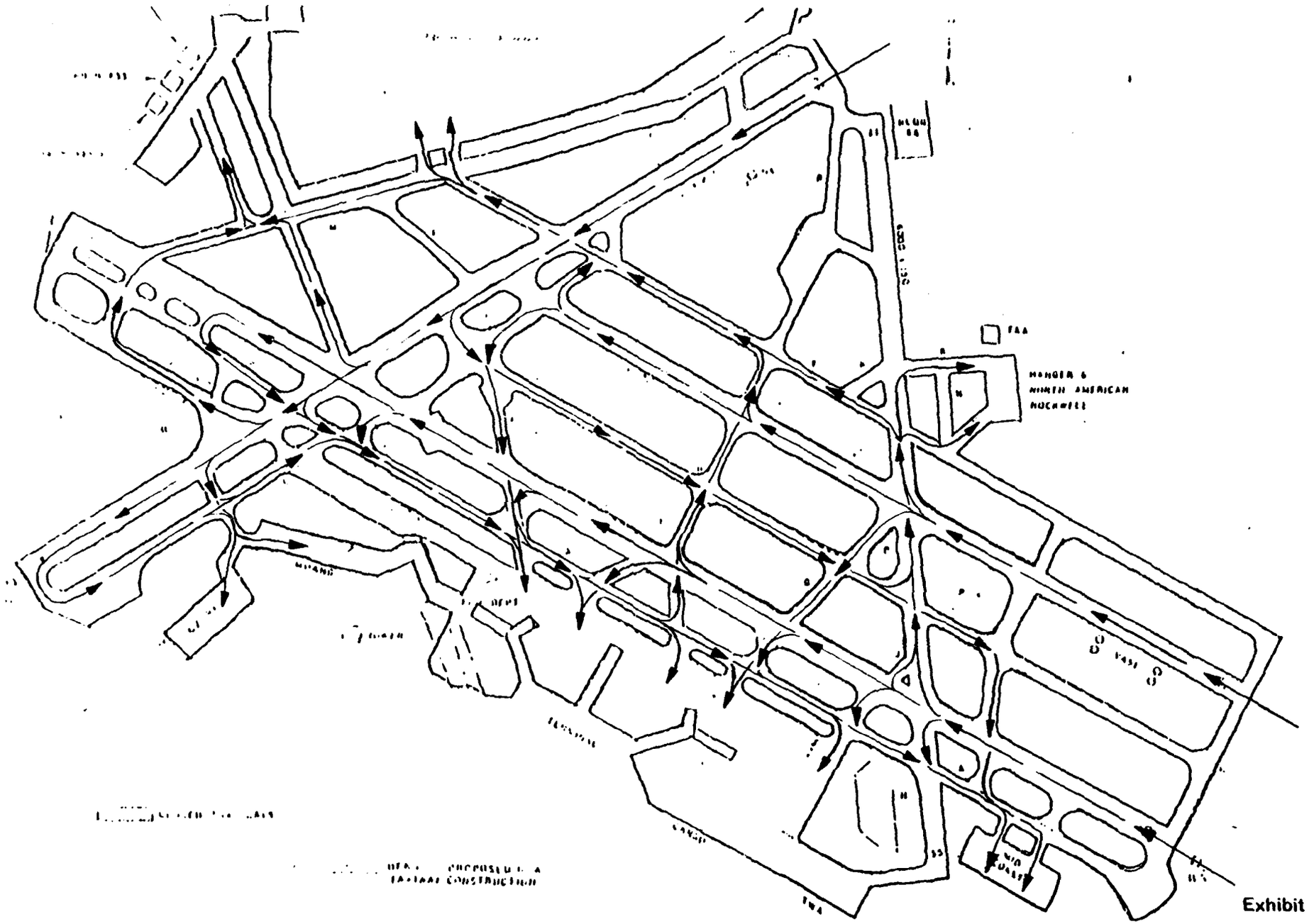


Exhibit 4A

Lambert—St. Louis International Airport

PRESENT CONFIGURATION
FLOW DIAGRAM
ARRIVALS ON RUNWAYS 30R AND 30L AND 24

Peat, Marwick, Mitchell & Co. March 1980

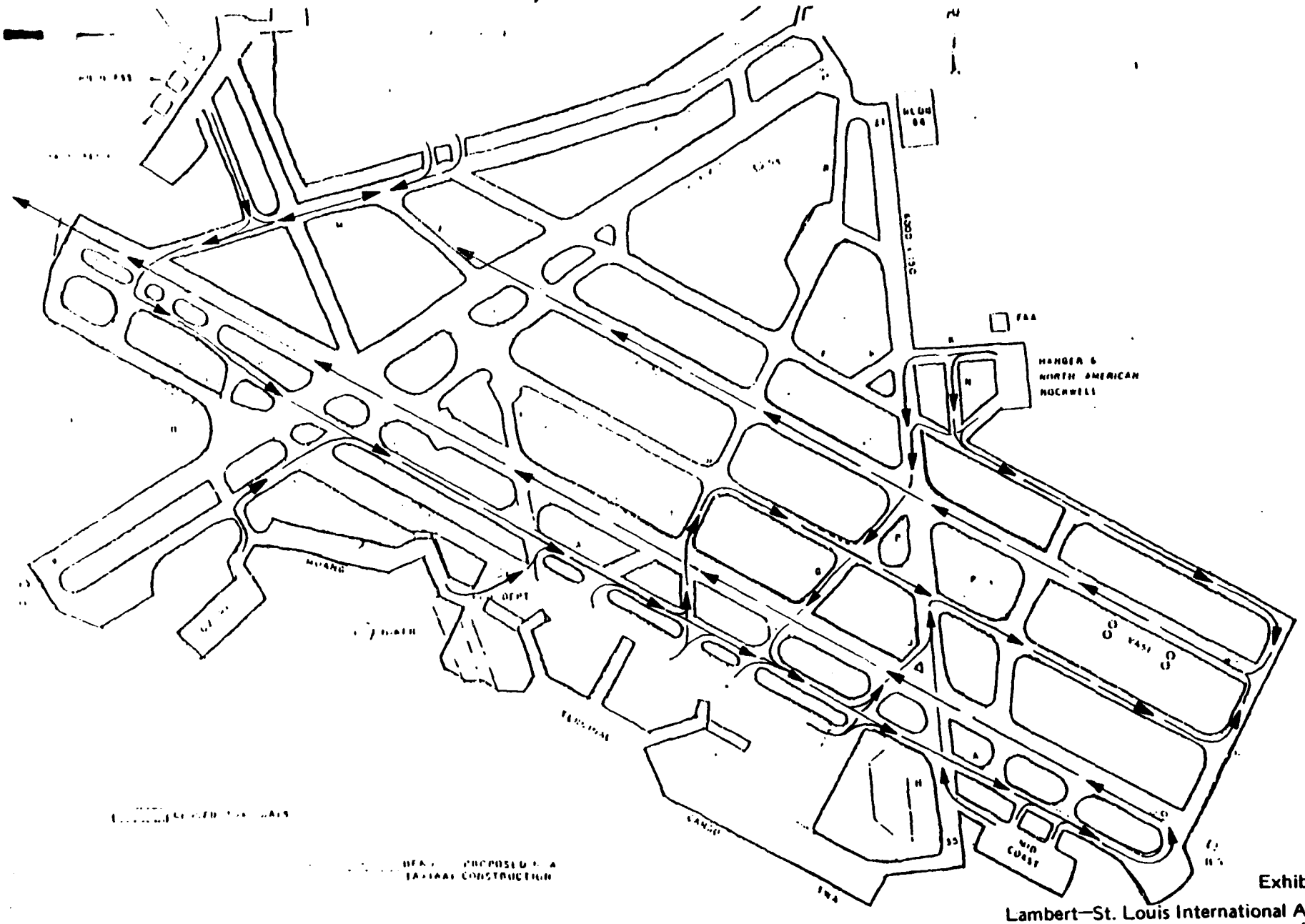


Exhibit 4B

Lambert—St. Louis International Airport

PRESENT CONFIGURATION
FLOW DIAGRAM
DEPARTURES ON RUNWAYS 30R AND 30 L

Peat, Marwick, Mitchell & Co. March 1980

28. Exit Taxiway Utilization (percent):

Runway	Class	Exit B	G	C	17-35
30R	A				100
	B	28	36		36
	C	34	2	64	
	D	4		96	

		C	L	A	P
24	A				100
	B			18	82
	C	8	40	50	2
	D	28	58	14	

		A	E	B-left	B-right	G	J	17-35
30L	A					1	4	95
	B			7		73	14	6
	C	16	44	28	12			
	D	17	78	5				

29. Arrival Runway Occupancy Times (seconds):

Runway	Class	Exit B	G	C	17-35	Weighted average
30R	A				46	46
	B	52	40		38	43
	C	45	45	58		53
	D	45		58		57

		A	E	B-left	B-right	G	J	17-35	Weighted average
30L	A					52	41	38	38
	B			54		43	34	32	42
	C	61	52	40	41				49
	D	72	57	41					59

		C	L	A	P	Weighted average
24	A			57	48	48
	B			48	41	44
	C	70	56	48	33	53
	D	70	56			59

30. Touch and Go Occupancy Times: No touch and go's.

31. Departure Runway Occupancy Times (seconds):

Aircraft class	Mean	Standard deviation
A	34	4
B	34	4
C	39	4
D	39	4

32. Taxi Speeds (mph): 5, 10, 15, 20, 25, and 35 (Exhibit 4c).

33. Approach Speeds (knots):

Aircraft class	Mean	Standard deviation
A	95	10
B	120	10
C	130	10
D	140	10

34. Gate Service Times: To be supplied by airport task force.

35. Airspace Travel Times: Table 4.

36. Runway Crossing Times: 20 seconds.

37. Lateness Distribution: To be supplied by airport task force.

38. Schedule: 1979 Demand and Mix.

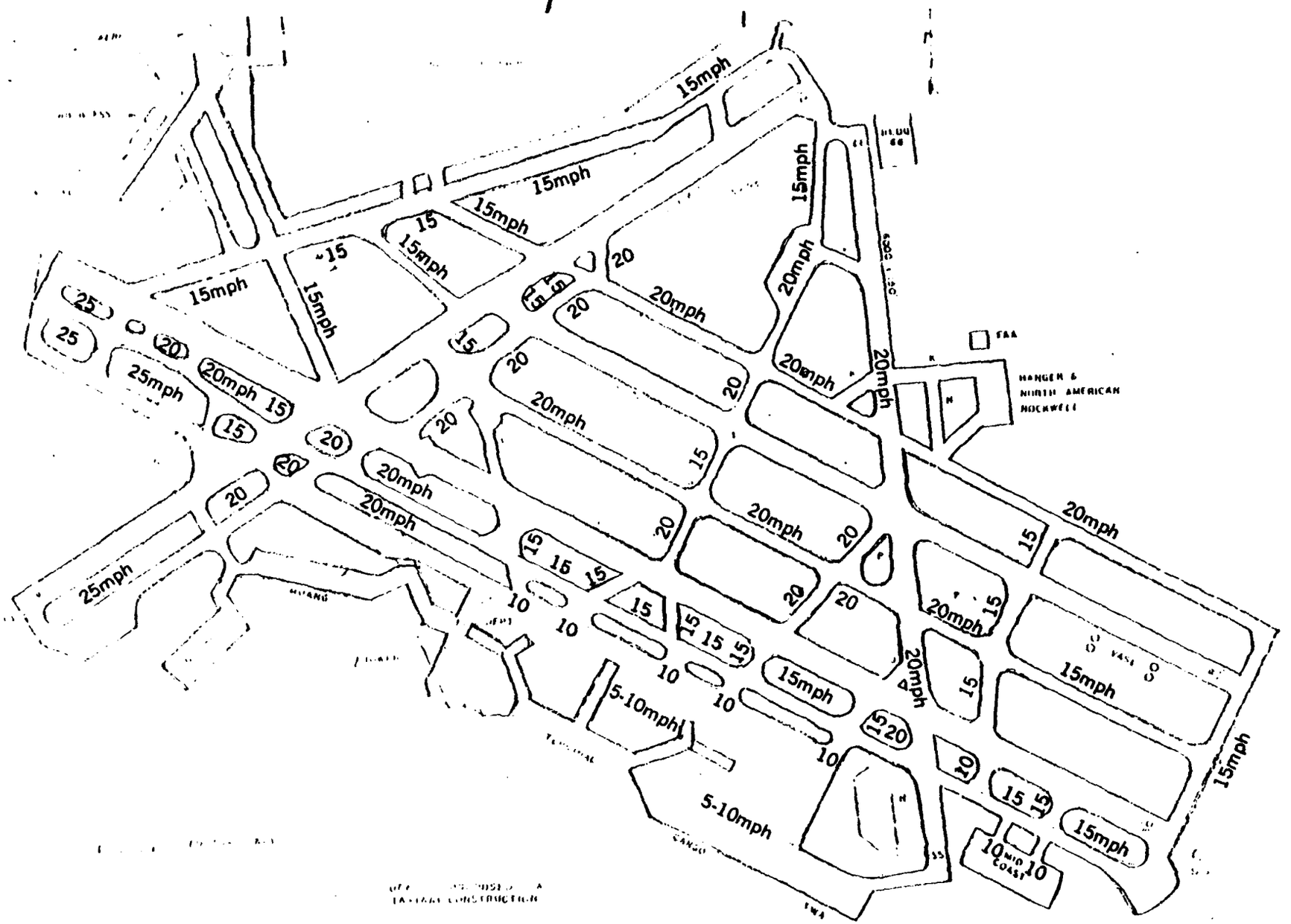


Exhibit 4C

Lambert—St. Louis International Airport

GENERALIZED TAXIWAY SPEEDS FOR ARRIVALS ON RUNWAYS 30R, 30L AND 24, AND DEPARTURES ON RUNWAYS 30R AND 30L

Peat, Marwick, Mitchell & Co. March 1980

Table 4

ARRIVAL FIX TRAVEL TIME--EXPERIMENT 7A
Lambert-St. Louis International Airport
Airport Improvement Task Force Delay Studies

Runway name	Fix code	Class	Travel time (minutes)
24	K	1	10.5
24	K	2	10.5
24	K	3	12.5
24	K	4	13.0
24	B	1	--
24	B	2	14.5
24	B	3	14.5
24	B	4	--
24	F	1	12.5
24	F	2	12.5
24	F	3	16.5
24	F	4	--
24	V	1	--
24	V	2	13.0
24	V	3	16.5
24	V	4	--
30R	K	1	--
30R	K	2	11.0
30R	K	3	14.5
30R	K	4	15.0
30R	B	1	--
30R	B	2	12.0
30R	B	3	14.0
30R	B	4	--
30R	F	1	--
30R	F	2	13.0
30R	F	3	17.0
30R	F	4	--
30R	V	1	11.0
30R	V	2	--
30R	V	3	13.0
30R	V	4	--
30L	K	1	11.0
30L	K	2	11.0
30L	K	3	11.0
30L	K	4	--
30L	B	1	9.5
30L	B	2	10.5
30L	B	3	12.5
30L	B	4	--
30L	F	1	13.0
30L	F	2	13.0
30L	F	3	14.5
30L	F	4	15.5
30L	V	1	13.0
30L	V	2	13.5
30L	V	3	17.0
30L	V	4	--

Experiment 12--Runways 17, 12R, and 12L
VFR Baseline
1979 Demand and Mix
Present ATC Procedures

A. Logistics

1. Title: Lambert-St. Louis International Airport
Experiment 12

2. Random Number Seeds: 2017, 3069, 4235, 5873, 6981, 7137, 8099, 9355, 0123, 1985

3. Start and Finish Times: 0700 to 2200

4. Print Options: Standard options including summary outputs

5. Airline Names:
AA - American
AL - USAir
BN - Braniff
DL - Delta
EA - Eastern
FL - Frontier
NW - Northwest Orient
OZ - Ozark
RC - Republic
TI - Texas International
TW - Trans World Airlines
AT - Air Taxi
AF - Air Freight
ML - Military
GA - General Aviation
SS - Supplemental

6. Processing Options: COMPUTE

7. Truncation Limits: ± 2 standard deviations

8. Time Switch: Not applicable

B. Airfield Physical Characteristics

9. Airfield Network: See Exhibit 1.

10. Number of Runways: 3

11. Runway Identification: 17, 12R, and 12L

12. Departure Runway End Links:
for 12R - Taxiway A
for 12L - Taxiway C

13. Runway Crossing Links Clearance Times (seconds):

Runway	Crossing link	Crossing clearance times: Arrival on runway D	C	B	A	Departure on runway D	C	B	A	Arrival on final D	C	B	A
12L	G	33	33	41	48	27	27	28	30	20	20	20	20
12L	17-35	33	33	41	48	27	27	28	30	20	20	20	20
12L	B	20	20	27	33	18	18	18	19	20	20	20	20
12L	6-24	15	15	15	15	15	15	15	15	20	20	20	20
12R	M	15	15	15	15	15	15	15	15	20	20	20	20
12R	R	60	57	60	50	47	47	42	42	20	20	20	20
12R	G	57	56	61	50	38	38	42	42	20	20	20	20
12R	E	34	38	44	50	27	27	29	32	20	20	20	20
12R	C	29	29	37	44	16	16	18	20	20	20	20	20
12R	6-24	20	20	27	33	19	19	19	23	20	20	20	20
12R	Midcoast	24	24	32	38	22	22	23	26	20	20	20	20
17	K	0	0	28	34	0	0	0	0	20	20	20	20
17	F	0	0	32	38	0	0	0	0	20	20	20	20

14. Exit Taxiway Locations:

Runway	Exit	Feet from threshold
12R	R	9,590
12R	17-35	7,280
12R	J	6,975
12R	G	6,005
12R	B	4,910
12R	E	3,510
12L	R	6,630
12L	P	4,560
12L	G	3,465
12L	17-35	3,465
12L	B	1,945
17	F	2,370
17	K	2,000

15. Holding Area-Link Number: 47

16. Airline Gates:

American -	3
Braniff -	1
Delta -	2
Eastern -	1,2
Frontier -	4
Northwest Orient -	6
USAir -	1
Ozark -	6
Republic -	5
TI -	1
TWA -	5
Air Taxi -	1,3
Air Freight -	6
Supplemental -	6

17. General Aviation Basing Areas: 7, 8, 9, 10, 11, 12, 13, and 14

C. ATC Procedures

18. Aircraft Separations:

Arrival-Arrival Separation-VFR (nautical miles)

Lead Aircraft Class	Trail Aircraft Class A	B	C	D
A	2.7	2.9	3.0	3.1
B	2.7	2.9	3.0	3.1
C	3.5	3.7	3.0	3.1
D	5.3	5.5	4.7	3.9

Departure-Departure Separations-VFR (seconds)

Lead Aircraft Class	Trail Aircraft Class A	B	C	D
A	30	30	45	50
B	35	40	45	50
C	45	45	60	60
D	120	120	120	90

Departure-Arrival Separation (nautical miles)

		Trail Aircraft Class			
		A	B	C	D
Lead Aircraft Class	A	1.1	1.4	1.5	1.6
	B	1.1	1.4	1.5	1.6
	C	1.8	1.8	1.8	1.8
	D	1.8	1.8	1.8	1.8

Aircraft operations on the parallel runways are dependent when there is a heavy aircraft on either runway.

19. Route Data: See Exhibits 5a and 5b.

20. Two-Way Path Data: See Exhibits 5a and 5b.

21. Common Approach Paths:

	Aircraft class	Length (nautical miles)
VFR	A	2.0
	B	2.0
	C	6.0
	D	6.0

22. Vectoring Delays: Report sum of speed control, vectoring, and holding delay as one total.

23. Departure Runway Queue Control: Not used.

24. Gate Hold Control: When Runway 12L queue exceeds 6, when Runway 12R queue exceeds 10.

25. Departure Airspace Constraints: Specified in separations and no aircraft held at gate due to airspace constraints.

26. Runway Interarrival Gap: Arrival separations increase from those specified in No. 18 to 8 miles when departure queue is greater than 6 on Runway 12R and greater than 4 on Runway 12L.

27. Runway Crossing Delay Control: Arrival separations increase from those in No. 18 to 5 miles when crossing queue is greater than 4 on Runway 12R and greater than 2 on Runway 12L.

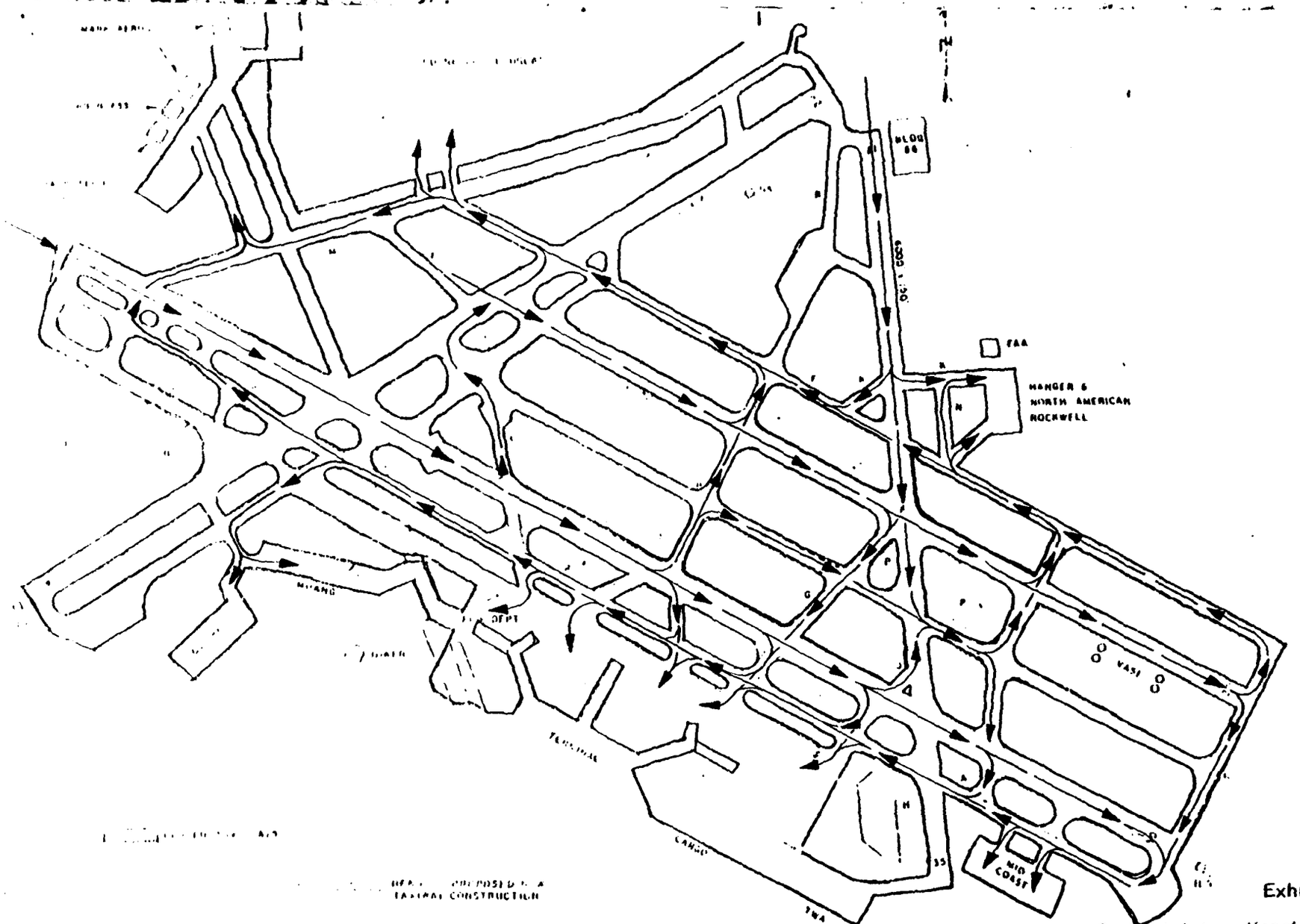


Exhibit 5A

Lambert—St. Louis International Airport

PRESENT CONIFGURATION
FLOW DIAGRAM
ARRIVALS ON RUNWAYS 12R, 12L AND 17

Peat, Marwick, Mitchell & Co. March 1980

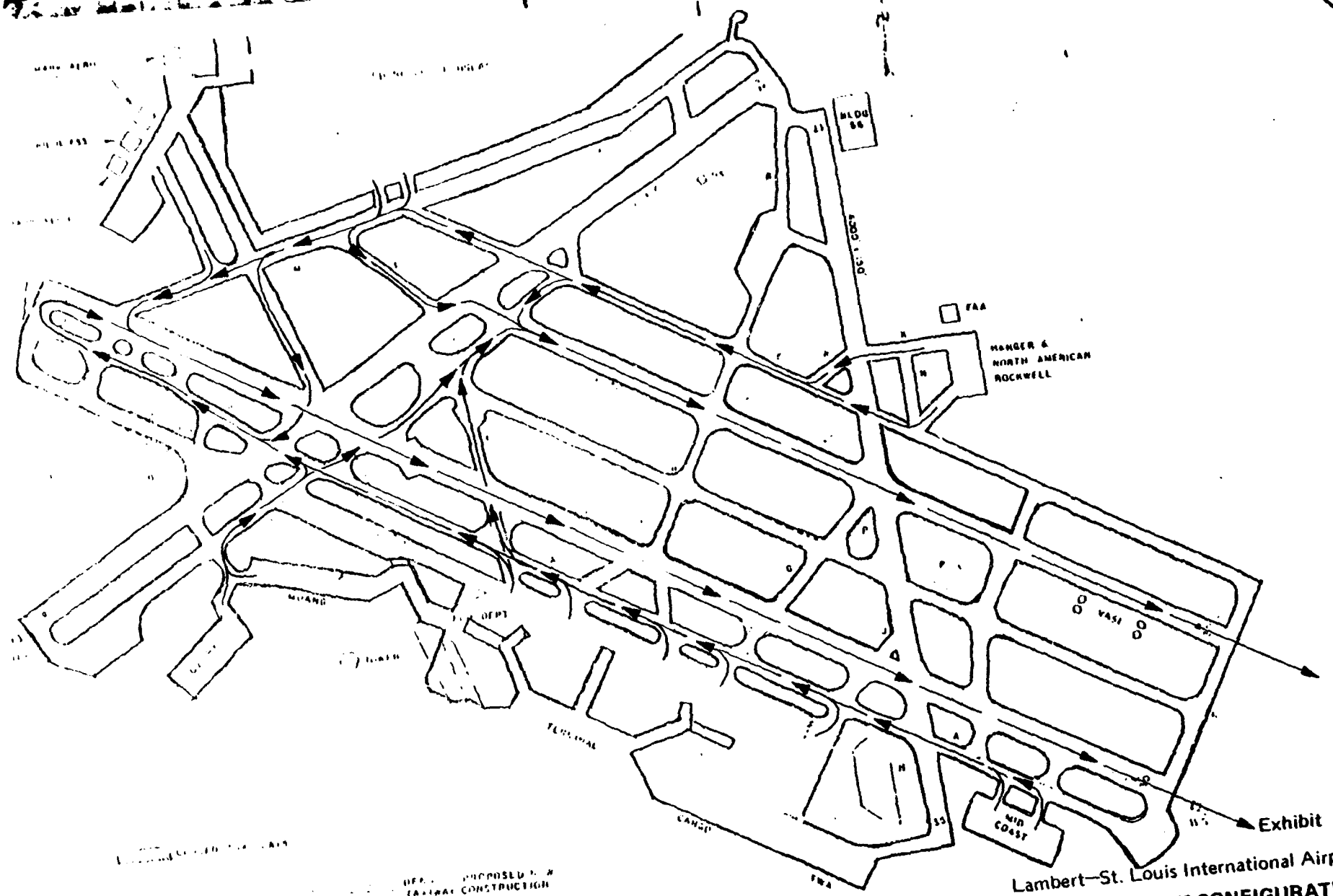


Exhibit 5B

Lambert—St. Louis International Airport

PRESENT CONFIGURATION
FLOW DIAGRAM
DEPARTURES ON RUNWAYS 12R AND 12L

Peat, Marwick, Mitchell & Co. March 1980

28. Exit Taxiway Utilization (percent):

Runway	Class	Exit				
		17-35	J	G	B	E
12R	A					100
	B	17	6	13	46	18
	C	14	17	39	28	2
	D	15	29	42	14	

		R	N	G	17-35	B
12L	A			8	9	83
	B		16	40	42	2
	C	65	33		2	
	D	100				

		F	K
17	A	85	15
	B		--
	C		--
	D		--

29. Arrival Runway Occupancy Times (seconds):

Runway	Class	Exit					Weighted average
		17-35	J	G	B	E	
12R	A					50	50
	B	60	60	53	50	44	52
	C	57	56	50	41	38	50
	D	61	54	47	40		56

Runway	Class	Exit					Weighted average
		R	N	G	17-35	B	
12L	A				48	34	36
	B		52	48	42	27	43
	C	62	43	42	34		55
	D	62					62

		F	K
17	A	34	38
	B		--
	C		--
	D		--

30. Touch and Go Occupancy Times: No touch and go's.

31. Departure Runway Occupancy Times (seconds):

Aircraft class	Mean	Standard deviation
A	34	4
B	34	4
C	39	4
D	39	4

32. Taxi Speeds (mph): 5, 10, 15, 20, 25, and 35 (see Exhibit 7c).

33. Approach Speeds (knots):

Aircraft class	Mean	Standard deviation
A	95	10
B	120	10
C	130	10
D	140	10

34. Gate Service Times: To be supplied by airport task force

35. Airspace Travel Times: See Table [illegible].

36. Runway Crossing Times: 20 seconds

37. Lateness Distribution: To be supplied by airport task force

38. Schedule: 1979 Demand and Mix

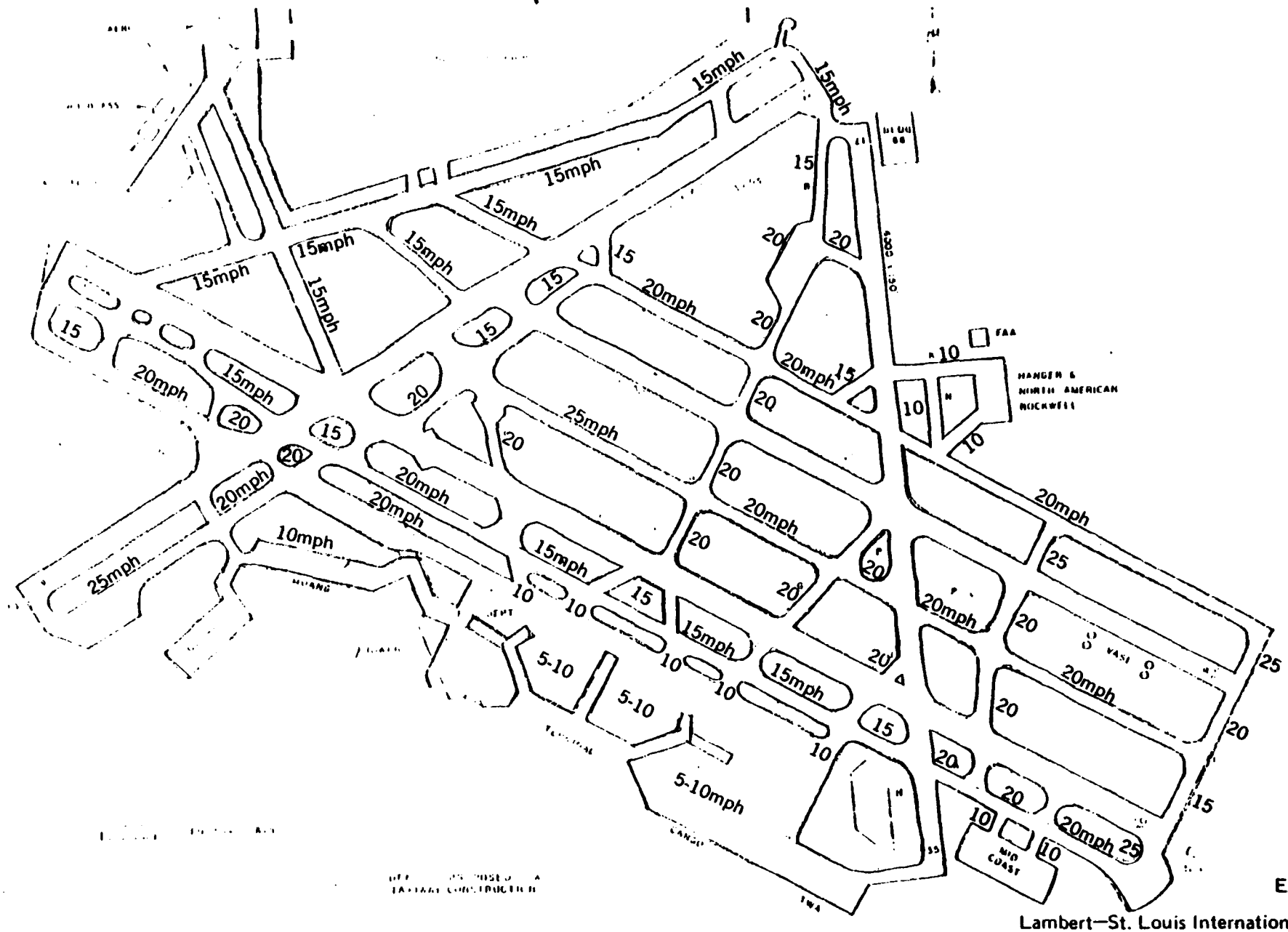


Exhibit 5C

Lambert—St. Louis International Airport

PRESENT CONFIGURATION
FLOW DIAGRAM
ARRIVALS ON RUNWAYS 12R, 12L AND 17, AND
DEPARTURES ON RUNWAYS 12R AND 12L

Peat, Marwick, Mitchell & Co. March 1980

Table 5

ARRIVAL FIX TRAVEL TIME--EXPERIMENT 12
Lambert-St. Louis International Airport
Airport Improvement Task Force Delay Studies

Runway name	Fix code	Class	Travel time (minutes)
12R	K	1	13.0
12R	K	2	13.0
12R	K	3	15.0
12R	K	4	--
12R	B	1	13.0
12R	B	2	13.5
12R	B	3	16.5
12R	B	4	17.0
12R	F	1	11.0
12R	F	2	11.0
12R	F	3	11.5
12R	F	4	--
12R	V	1	11.0
12R	V	2	11.0
12R	V	3	11.5
12R	V	4	--
12L	K	1	--

ATTACHMENT C

INPUT DATA SUMMARY

ANNUAL DELAY EXPERIMENTS

Lambert-St. Louis International Airport

St. Louis
Airport Improvement Task Force Delay Studies

Prepared by

Peat, Marwick, Mitchell & Co.
San Francisco, California

May 1980

Experiment 81

1. Annual Demand: 344, 600

2. Group Specification:

3 day groups - high, average, low
12 week groups - 12 months, January through December (1978)
3 weather groups - VFR, IFR1, IFR2 and 3
6 runway uses

	Annual runways	Departure runways
1.	12R, 12L	12R, 12L
2.	30R, 30L	30R, 30L
3.	30R, 30L, 24	30R, 30L
4.	12R, 12L	12R, 12L, 6
5.	24	24
6.	12R, 12L, 17	12R, 12L

3&
4. Traffic Distributions:

Week group	Jan.	Feb.	Mar.	Apr.	May	June
Percent of annual in one week	1.74	1.75	1.88	1.97	2.11	2.10
Number of weeks in one month	4.43	4.0	4.43	4.29	4.43	4.29
Percent of annual in one month	7.70	7.00	8.34	8.44	9.35	9.01

Week group	July	Aug.	Sep.	Oct.	Nov.	Dec.
Percent of annual in one week	2.05	2.13	1.92	1.60	1.89	1.84
Number of weeks in one month	4.43	4.43	4.29	4.43	4.29	4.43
Percent of annual in one week	9.08	9.43	8.49	6.88	8.09	8.13

5&
6. Daily Traffic Distribution (August 1978 combined 2-week period 8/18/78 to 8/31/78):

Day group	High	Average	Low
Percent of weekly in one day	16.04	14.49	11.45
Number of days in day group	3	2	2
Percent of weekly traffic in day group	48.13	28.98	22.89

7. Weather Occurrences:

	Jan.	Feb.	Mar.	Apr.	May	June
Percent VFR	78.66	80.22	70.72	96.42	86.60	96.41
Percent IFR1	5.71	11.54	6.70	1.79	3.72	2.05
Percent IFR2&3	15.63	8.24	22.58	1.79	9.68	1.54
	July	Aug.	Sep.	Oct.	Nov.	Dec.
Percent VFR	90.81	98.51	94.62	93.55	75.13	81.15
Percent IFR1	3.23	0.99	3.59	5.21	6.41	4.71
Percent IFR2&3	5.96	0.50	1.79	1.24	18.46	14.14

8. Hourly Runway Capacity Parameters:

Runway use	Hourly Capacity (Ops/hr) VFR1	IFR1	IFR2&3
1	103	59	58
2	103	59	58
3	108	60	59
4	109	59	58
5	55	53	47
6	108	60	59

9. Runway Use/Weather Group Demand Factors:

	VFR1	IFR1	IFR2&3
For all runways	1.0	0.9	0.81

10. Runway Use Occurrence:

	Percent occurrence		
Runway	VFR1	IFR1	IFR2&3
1	45	41.8	23.9
2	53	56.7	74.1
3	0.7	0.5	0.3
4	0.3	0.2	0.2
5	0.7	0.6	1.4
6	0.3	0.2	0.1

11. Hourly Traffic:

Hour	Percent daily traffic	Hour	Percent daily traffic	Hour	Percent daily traffic	Hour	Percent daily traffic
00	1.0	06	1.9	12	4.9	18	7.0
01	0.5	07	4.5	13	5.5	19	7.4
02	0.1	08	7.0	14	5.7	20	5.1
03	0.5	09	6.0	15	5.0	21	3.2
04	1.1	10	5.4	16	8.3	22	4.1
05	1.9	11	4.6	17	7.0	23	2.3

12&
13. Delay Curve Specifications: To be determined after airfield simulation runs

14. Percent Arrivals - Daily percentage - 49.9%

Hour	Percent arrivals	Hour	Percent arrivals	Hour	Percent arrivals	Hour	Percent arrivals
00	50.0	06	50.0	12	46.5	18	46.2
01	50.0	07	50.0	13	56.4	19	46.6
02	50.0	08	50.7	14	35.4	20	47.4
03	50.0	09	49.1	15	68.8	21	50.0
04	50.0	10	35.6	16	55.6	22	50.0
05	50.0	11	59.5	17	52.3	23	50.0

15. Cancellation Diversion Specification: To be provided by Task Force

16. Title: St. Louis Annual Baseline 1979 Demand and Mix

Table 6

DEMAND AND TRAFFIC DISTRIBUTION
Lambert-St. Louis International Airport
Airport Improvement Task Force Delay Studies

Annual Demand: 1978 - 340,476
1979 - 336,578
Revised 1979[a] - 344,600

Traffic Distribution:

1978

Week group	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Percent of annual in one week	1.63	1.75	1.83	1.95	1.94	2.11	1.95	2.08	2.18	2.02	1.84	1.73
Number of weeks in one month	4.43	4.00	4.43	4.29	4.43	4.29	4.43	4.43	4.29	4.43	4.29	4.43
Percent of annual in one month	7.21	7.01	8.10	8.36	8.60	9.05	8.62	9.21	9.34	8.95	7.90	7.65

1979

Percent of annual in one week	1.74	1.75	1.88	1.97	2.11	2.10	2.05	2.13	1.92	1.60	1.89	1.84

ST. LOUIS DATA PACKAGE

Annual Delay Model Changes

1. Annual Demand	1985 Demand - 339,000
2. Group Specification	
3. Traffic Distribution 4.	
5. Daily Traffic Distribution 6.	
7. Weather Occurrences	
8. Hourly Runway Capacity Parameter	See Table 9
9. Runway Use/Weather Group Demand Factor	
10. Runway Use Occurrences	
11. Hourly Traffic	
12. Delay Curve Specification 13.	To be determined by airfield simulation
14. Percent Arrivals	
15. Cancellation Diversion Specification	
16. Title	Lambert-St. Louis International Airport Experiment 82

Table 7

Runway use	Hourly capacity (Ops./hr) 1985		
	VFR1	IFR1	IFR2 and 3
1	89	55	54
2	92	55	54
3	93	55	54
4	95	55	54
5	53	52	46
6	93	55	54

ST. LOUIS DATA PACKAGE

Annual Delay Model Changes

1. Annual Demand	1990 Demand - 362,000
2. Group Specification	
3. Traffic Distribution 4.	
5. Daily Traffic Distribution 6.	
7. Weather Occurrences	
8. Hourly Runway Capacity Parameter	See Table 10
9. Runway Use/Weather Group Demand Factor	
10. Runway Use Occurrences	
11. Hourly Traffic	
12. Delay Curve Specification 13.	To be determined by airfield simulation
14. Percent Arrivals	
15. Cancellation Diversion Specification	
16. Title	Lambert-St. Louis International Airport Experiment 87

Table 8

Runway use	Hourly capacity (Ops./hr) 1990		
	VFR1	IFR1	IFR2 and 3
1	70	54	53
2	78	54	53
3	74	54	53
4	70	54	53
5	51	51	45
6	74	54	53

ATTACHMENT D

ASSUMPTIONS USED

IN

SIMULATION EXPERIMENTS

Lambert-St. Louis International Airport

St. Louis
Airport Improvement Task Force Delay Studies

Prepared by

Peat, Marwick, Mitchell & Co.
San Francisco, California

May 1980

The following is a list of assumptions used in performing the simulation runs of the Lambert-St. Louis Airport Improvement Task Force Delay Study experiments:

1. Operations on Runway 6-24: when Runway 6-24 is used in conjunction with Runways 12L-30R and 12R-30L, it is assumed that arriving aircraft on Runway 30R stop short of Runway 6-24. When both Runways 6 and 12L are used for takeoffs it is assumed that jet blast of departing aircraft on Runway 12L would not affect departures on Runway 6.

2. Wake Turbulence Interaction on Parallel Runways: when operations on Runways 12L-30R and 12R-30L include heavy aircraft, the model uses seperations that would be adequate to alleviate the wake-vortex interaction.

3. Exit Taxiway Utilization and Runway Occupancy Times: exit taxiway utilization and corresponding runway occupancy times are provided by NAFEC and supplemented by PMM&Co. data when necessary.

4. Runway Assignments: Table 11 shows runway assignments assumed for the four base cases, by arrivals and departures. It is further assumed that during IFR weather, 75% of general aviation Class A operations and 50% of general aviation Class B operations would not occur.

Table 9

Runway Assignment

Experiment No.	Runway	Percent of Aircraft							
		Arrivals				Departures			
		A	B	C	D	A	B	C	D
1	12L	100	80	20	--	100	80	20	--
	12R	--	20	80	100	--	20	80	100
4	30R	100	80	20	--	100	80	20	--
	30L	--	20	80	100	--	20	80	100
7A	30R	--	90	20	--	100	90	20	--
	30L	--	10	80	100	--	10	80	100
	24	100	--	--	--	--	--	--	--
12	12L	--	100	20	--	100	95	20	--
	12R	--	--	80	100	--	5	80	100
	17	100	--	--	--	--	--	--	--

ATTACHMENT E

SUMMARY OF RESULTS OF

AIRFIELD SIMULATION MODEL EXPERIMENTS

(Experiments 1, 4, 7a, and 12)

Lambert-St. Louis International Airport

St. Louis
Airport Improvement Task Force Delay Studies

Prepared by

Peat, Marwick, Mitchell & Co.
San Francisco, California

May 1980

Lambert-St. Louis International Airport Experiments

Experiment No. 1

Scenario:

This experiment is a baseline case using the existing airfield layout. Demand is at 1979 levels, and 1979 ATC Procedures are in effect in VFR conditions for the following runway configuration:

Arrival Runways	Departure Runways
12R, 12L	12R, 12L

Length and Level of Detail of Simulation Run:

From 0700 to 2200 with 1-hour summaries.

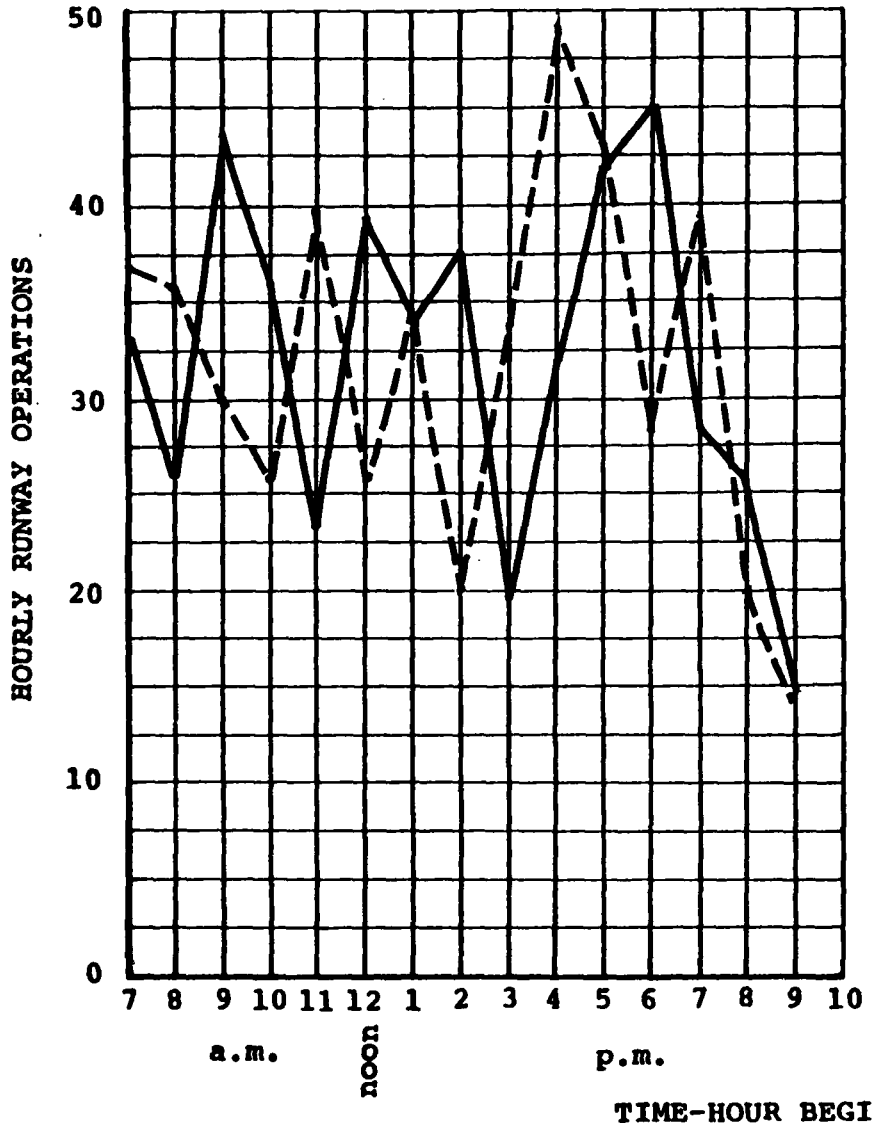
Results:

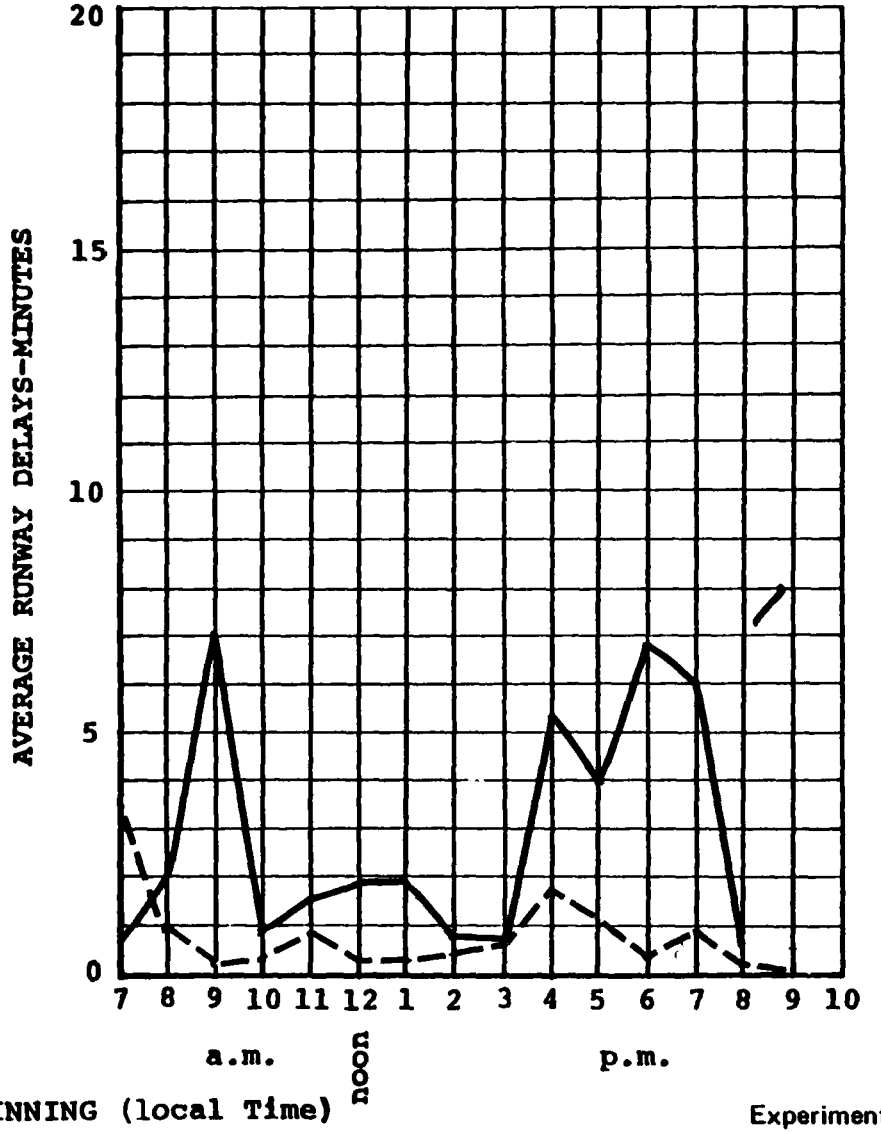
Below is a table that shows selected results for the peak-demand hour, 17001800 hours, and average values over the 16-hour simulation period.

Operation Type	Performance Measure	Units	Average[a]	Peak[b]
Arrival	Flow rate	a/c per hr.	31.7	49.3
Arrival	Air delay	minute	0.8	1.8
Departure	Flow rate	a/c per hr.	31.9	45.0
Departure	Runway delay	minute	2.7	6.8

a. Average over the entire simulation period.
b. For the peak-demand hour, 1700-1800 hours.

LAMBERT-ST. LOUIS INTERNATIONAL AIRPORT
AIRPORT IMPROVEMENT TASK FORCE DELAY STUDIES





TIME-HOUR BEGINNING (local Time)

LEGEND
Arrivals
Departures

LEGEND
Arrival Delay
Departure Delay

Experiment 1

Lambert - St. Louis International Airport

ARRIVALS ON 12R, 12L
DEPARTURES ON 12R, 12L
VFR BASELINE

Peat, Marwick, Mitchell & Co. May 1980

Lambert-St. Louis International Airport Experiments

Experiment No. 4

Scenario:

This experiment is a baseline case using the existing airfield layout. Demand is at 1979 levels, and 1979 ATC Procedures are in effect in VFR conditions for the following runway configuration:

Arrival Runways	Departure Runways
30R, 30L	30R, 30L

Length and Level of Detail of Simulation Run:

From 0700 to 2200 with 1-hour summaries and a short-form network.

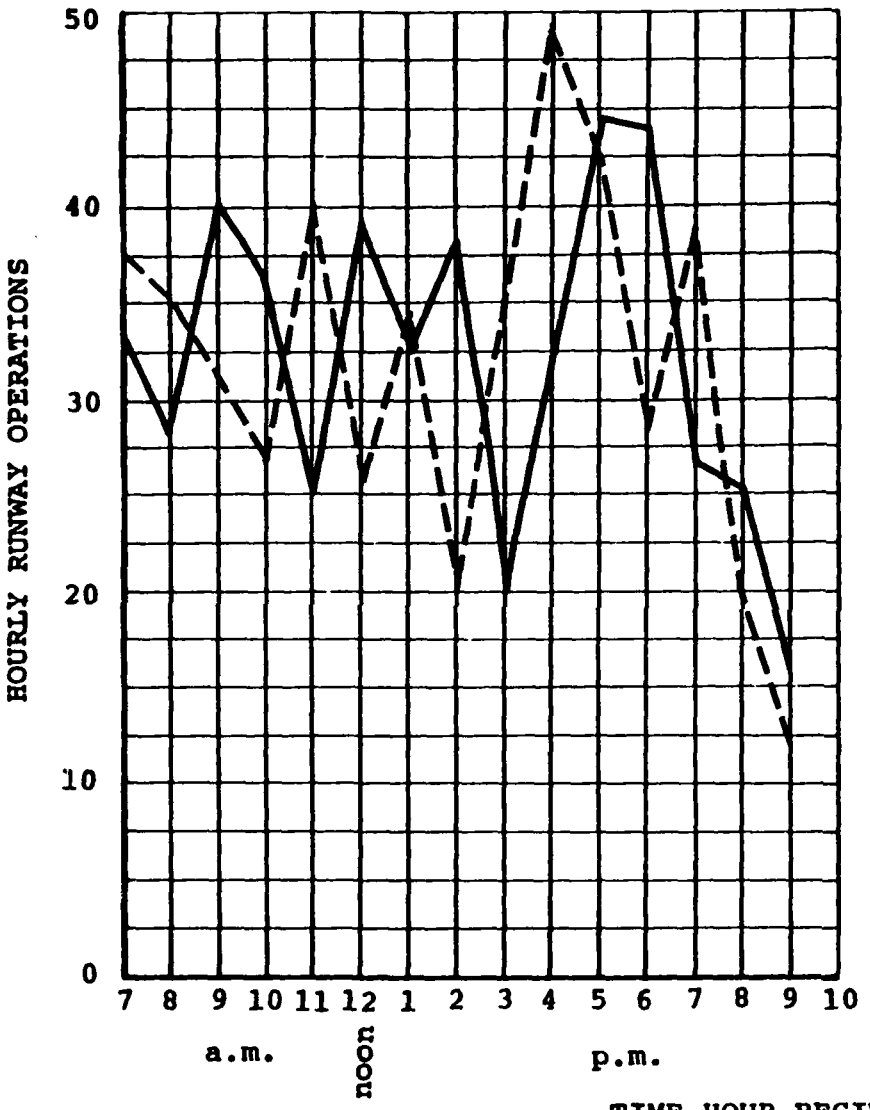
Results:

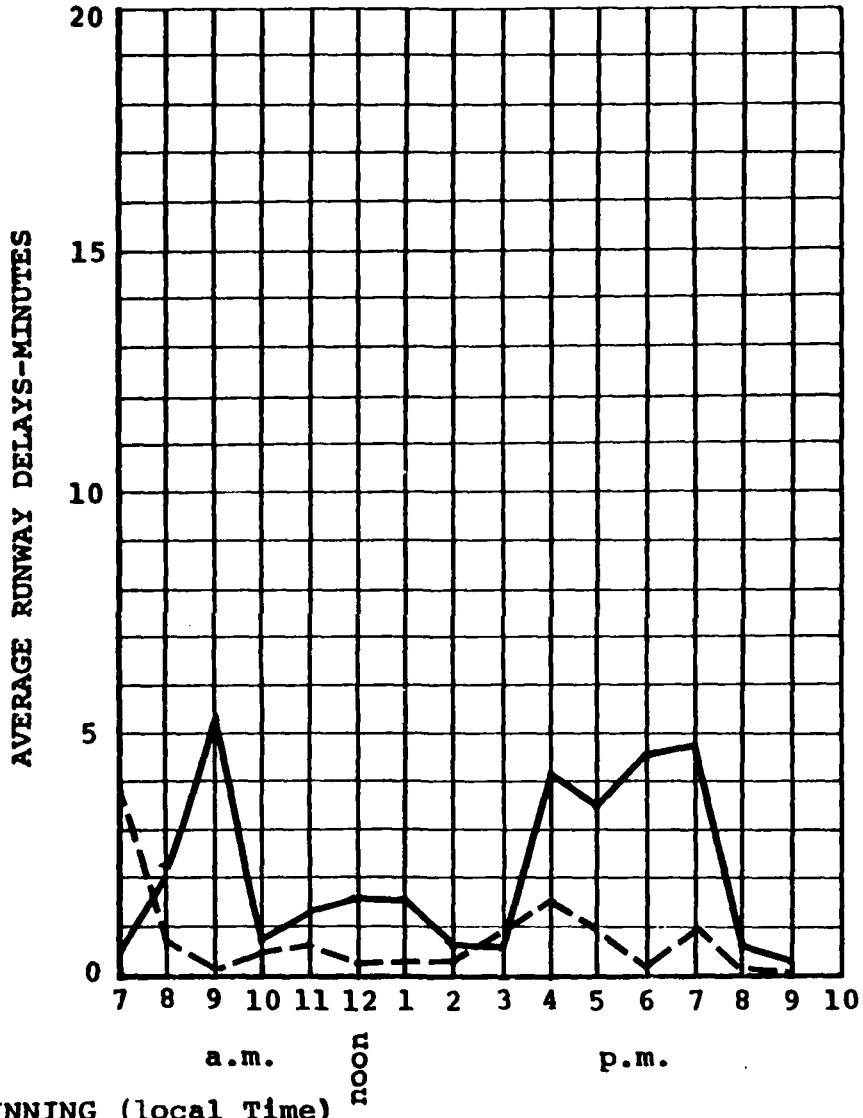
Below is a table that shows selected results for the peak-demand hour, 17001800 hours, and average values over the 16-hour simulation period.

Operation Type	Performance Measure	Units	Average[a]	Peak[b]
Arrival	Flow rate	a/c per hr.	31.7	49.6
Arrival	Air delay	minute	0.8	1.7
Departure	Flow rate	a/c per hr.	32.0	44.2
Departure	Runway delay	minute	2.1	3.6

a. Average over the entire simulation period.
b. For the peak-demand hour, 1700-1800 hours.

LAMBERT-ST. LOUIS INTERNATIONAL AIRPORT
AIRPORT IMPROVEMENT TASK FORCE DELAY STUDIES





TIME-HOUR BEGINNING (local Time)

LEGEND
- - - Arrivals
——— Departures

LEGEND
- - - Arrival Delay
——— Departure Delay

Experiment 4

Lambert - St. Louis International Airport

ARRIVALS ON 30R, 30L
DEPARTURES ON 30R, 30L
VFR BASELINE

Peat, Marwick, Mitchell & Co. May 1980

Lambert-St. Louis International Airport Experiments

Experiment No. 7A

Scenario:

This experiment is a baseline case using the existing airfield layout. Demand is at 1979 levels, and 1979 ATC Procedures are in effect in VFR conditions for the following runway configuration:

Arrival Runways	Departure Runways
30R, 30L, 24	30R, 30L

Length and Level of Detail of Simulation Run:

From 0700 to 2200 with 1-hour summaries and a short-form network.

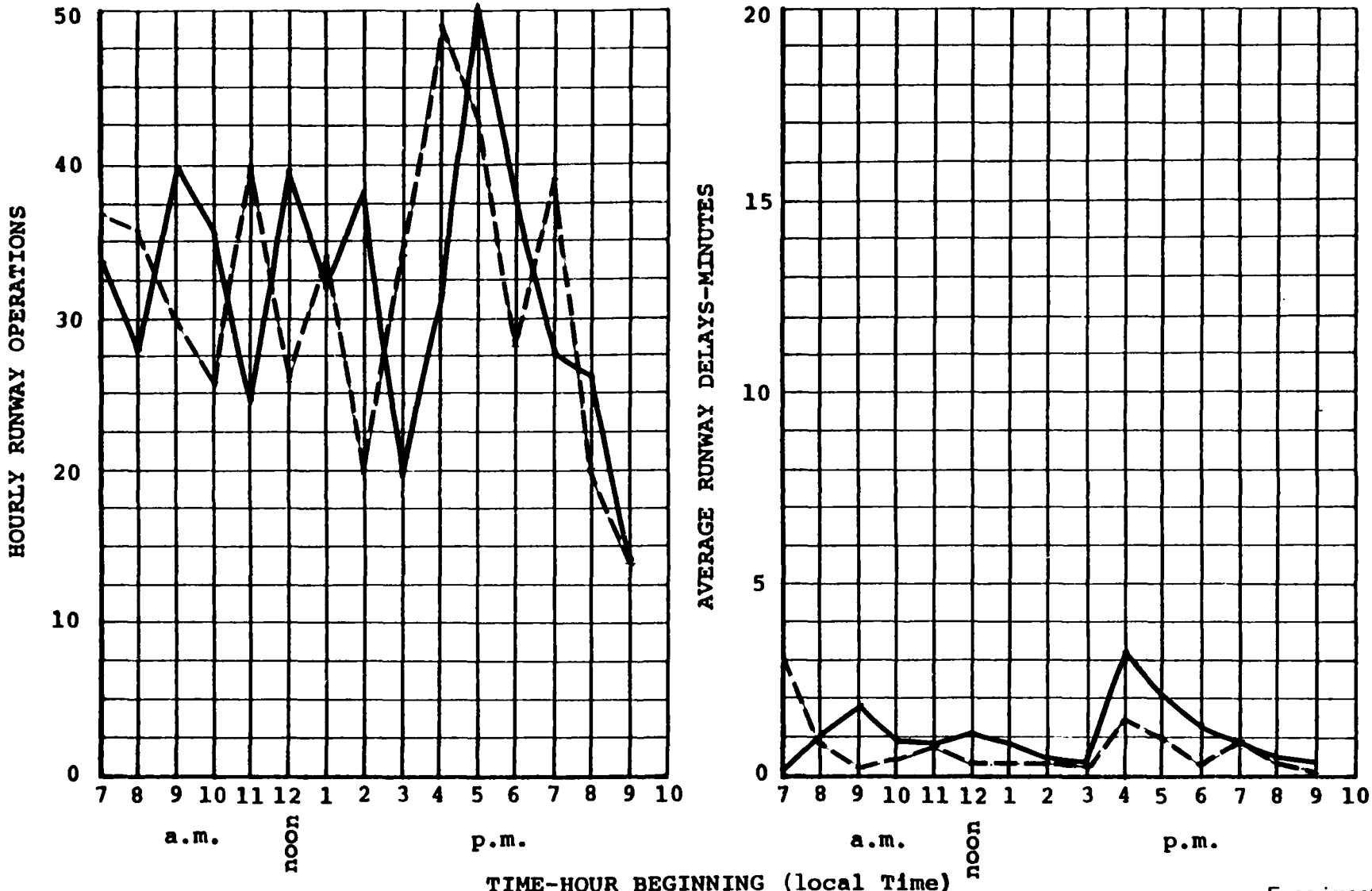
Results:

Below is a table that shows selected results for the peak-demand hour, 17001800 hours, and average values over the 16-hour simulation period.

Operation Type	Performance Measure	Units	Average[a]	Peak[b]
Arrival	Flow rate	a/c per hr.	31.7	43.0
Arrival	Air delay	minute	0.9	1.0
Departure	Flow rate	a/c per hr.	31.9	50.3
Departure	Runway delay	minute	1.2	2.2

a. Average over the entire simulation period.
b. For the peak-demand hour, 1700-1800 hours.

LAMBERT-ST. LOUIS INTERNATIONAL AIRPORT
AIRPORT IMPROVEMENT TASK FORCE DELAY STUDIES



Experiment 7A

Lambert - St. Louis International Airport

ARRIVALS ON 30R, 30L and 24
DEPARTURES ON 30R, 30L
VFR BASELINE

Peat, Marwick, Mitchell & Co. May 1980

Lambert-St. Louis International Airport Experiments

Experiment No. 12

Scenario:

This experiment is a baseline case using the existing airfield layout. Demand is at 1979 levels, and 1979 ATC Procedures are in effect in VFR conditions for the following runway configuration:

Arrival Runways	Departure Runways
12R, 12L GA Operations on 17	12R, 12L

Length and Level of Detail of Simulation Run:

From 0700 to 2200 with 1-hour summaries and a short-form network.

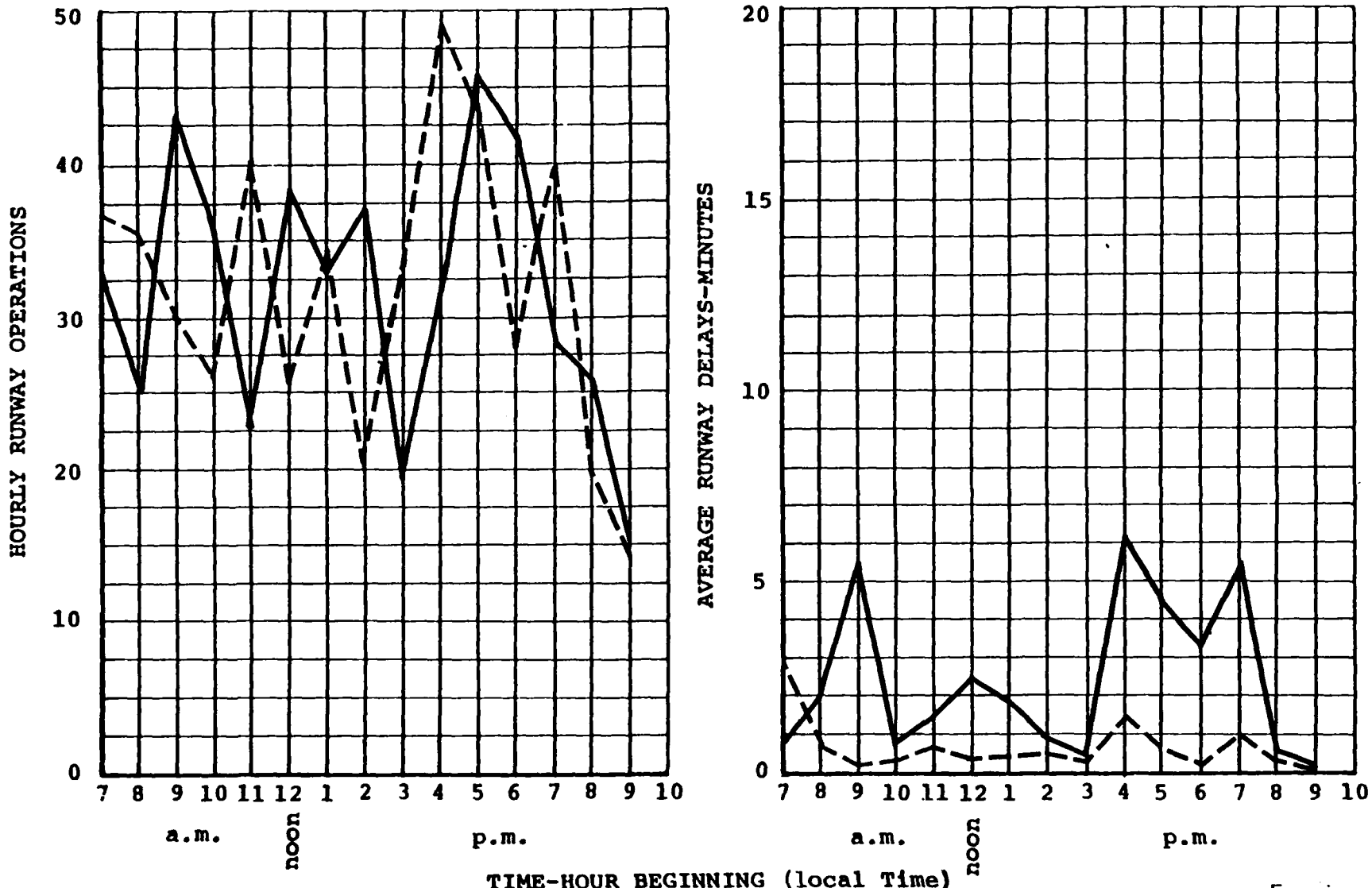
Results:

Below is a table that shows selected results for the peak-demand hour, 17001800 hours, and average values over the 16-hour simulation period.

Operation Type	Performance Measure	Units	Average[a]	Peak[b]
Arrival	Flow rate	a/c per hr.	31.7	48.9
Arrival	Air delay	minute	0.7	1.6
Departure	Flow rate	a/c per hr.	31.9	45.9
Departure	Runway delay	minute	2.4	4.5

a. Average over the entire simulation period.
b. For the peak-demand hour, 1700-1800 hours.

LAMBERT ST. LOUIS INTERNATIONAL AIRPORT
AIRPORT IMPROVEMENT TASK FORCE DELAY STUDIES



Experiment 12

Lambert - St. Louis International Airport

ARRIVALS ON 12R, 12L
DEPARTURES ON 12R, 12L
VFR BASELINE

Peat, Marwick, Mitchell & Co. May 1980

ATTACHMENT F

SUMMARY OF RESULTS OF

ANNUAL DELAY MODEL EXPERIMENTS

(Experiments 81, 82, 87)

Lambert-St. Louis International Airport

St. Louis
Airport Improvement Task Force Delay Studies

Prepared by

Peat, Marwick, Mitchell & Co.
San Francisco, California

May 1980

Table 10

SUMMARY OF ANNUAL DELAY MODEL EXPERIMENTS

Lambert-St. Louis International Airport

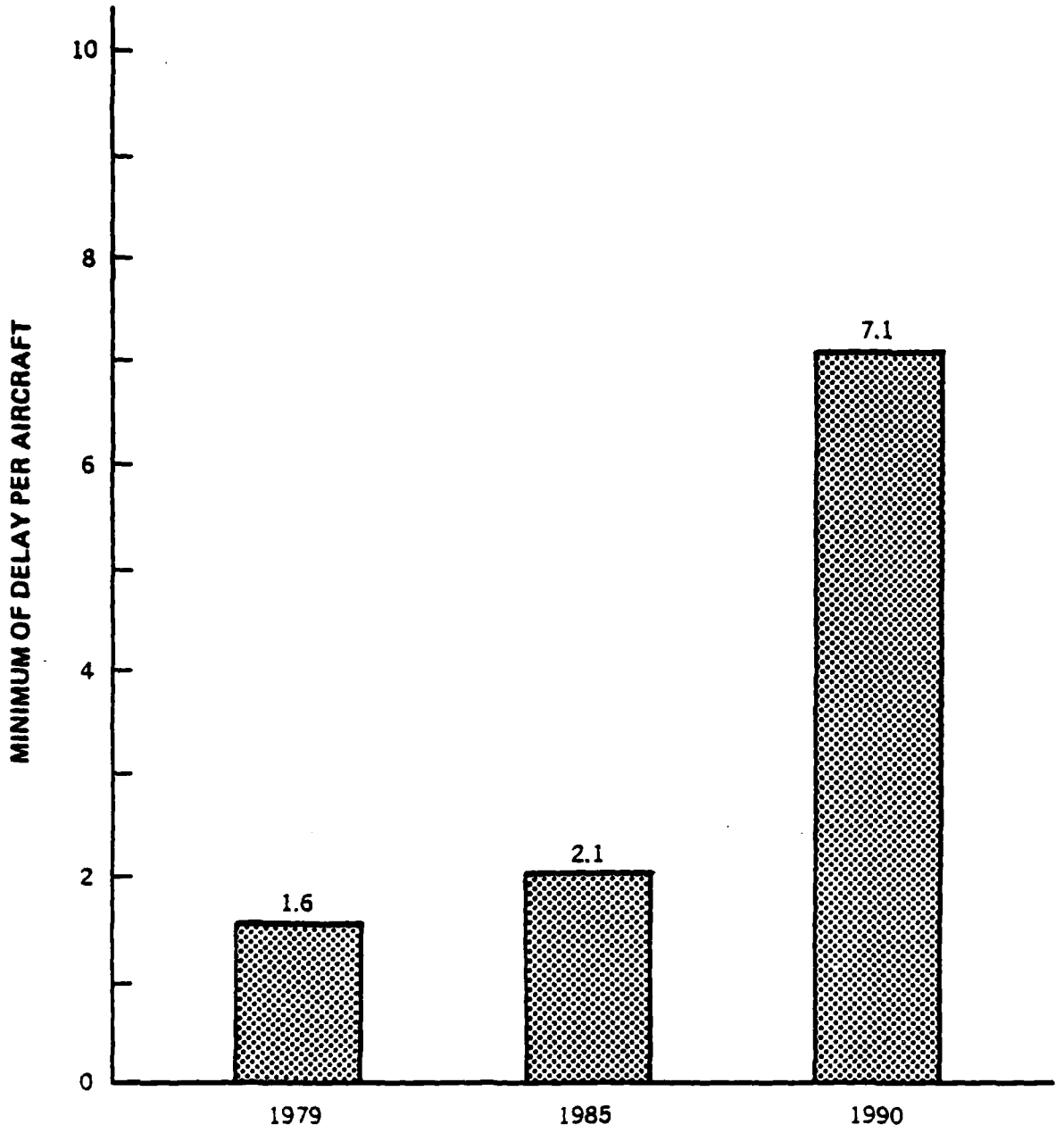
Experiment No.	Demand[a]	ATC Scenario	Airfield	Annual Delay (hours)	Average Aircraft Delay (minutes)	Average Peak-Hour Delay[b] (arrivals and departures) on 30L and 30R) VFR	IFR
81	1979[c]	1979	1979	~~9,154~~[d]	~~1.6~~[d]	2.2[d]	12.5[d]
82	1985	1979	1979	~~11,839~~	~~2.1~~	~~3.0~~	~~14.5~~
87	1990	1979	1979	~~42,687~~	~~7.1~~	~~7.9~~	~~18.3~~

a. Annual demand: 1979 = 344,600
1985 = 339,000
1990 = 362,000

b. Average day, peak month

c. Annual demand for 1979 assumes no Ozark Airlines strike. The actual demand was 336,578 with Ozark Airlines strike.

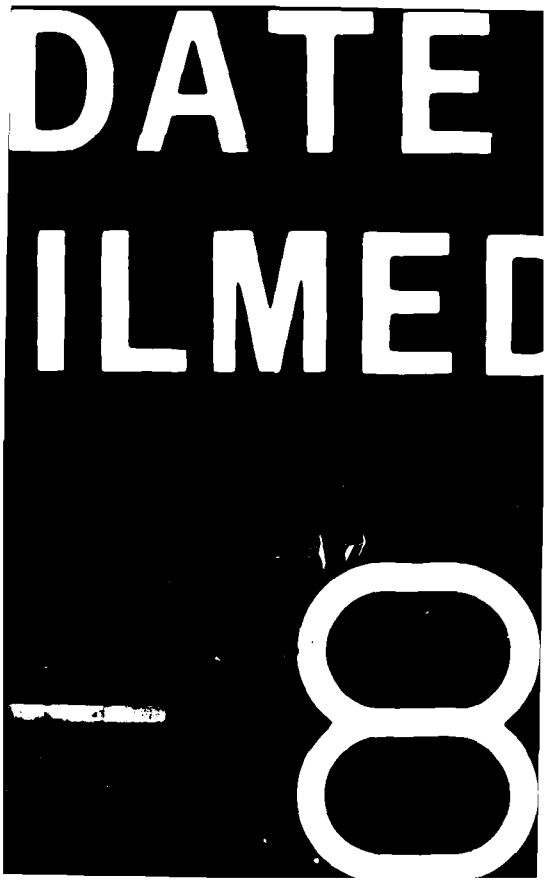
d. Actual delays in 1979 may be lower than this value because of the Ozark Airlines strike.



Lambert - St. Louis International Airport

AVERAGE ANNUAL DELAYS FOR DO NOTHING ALTERNATIVE

Peat, Marwick, Mitchell & Co. May 1980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